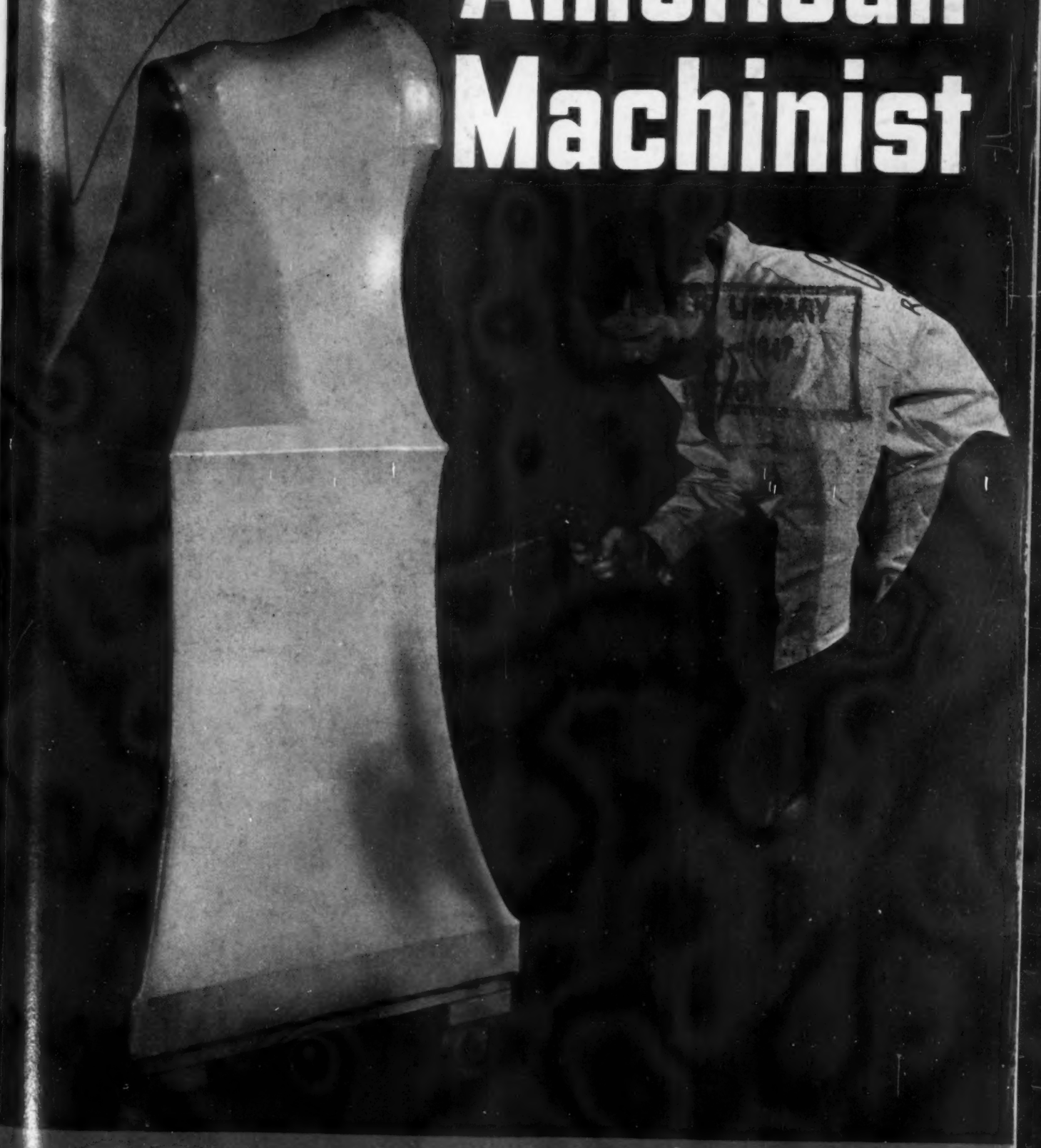
JANUARY 30, 1947

American Machinist



In this issue LABOR PRODUCTIVITY • FINISHING FOR CONTROLLED QUALITY • COCOONS PROTECT PRECISION EQUIPMENT •

RODS
RODS
RODS

Here's a machine that bores connecting rods as fast as your operator can load 'em!

The operator simply loads the machine, pushes two buttons, and this Heald No. 42 Bore-Matic swings into action. It bores the babbitt crank holes in four connecting rods to a .0003" tolerance, while the operator unloads four finished rods and loads four new ones. Then he pushes two buttons again, and the cycle repeats automatically.*

No wonder the automobile manufacturer who originally ordered a battery of these No. 42 Bore-Matics recently duplicated his order. For these machines pay for themselves in no time—by speeding up production, reducing rejects, and cutting manual work to a minimum.

Our field engineers will be glad to show you how the No. 42 handles pistons, pump housings, or cylinder sleeves, in as many different industries. Or, again, how it performs roughing and finishing operations as well as multiple boring, turning, facing and plunging—all in one continuous cycle.

Get in touch with the Heald branch office nearest you, or write: THE HEALD MACHINE COMPANY, Worcester 6, Mass.

HEALD

means more precision
. . . less cost

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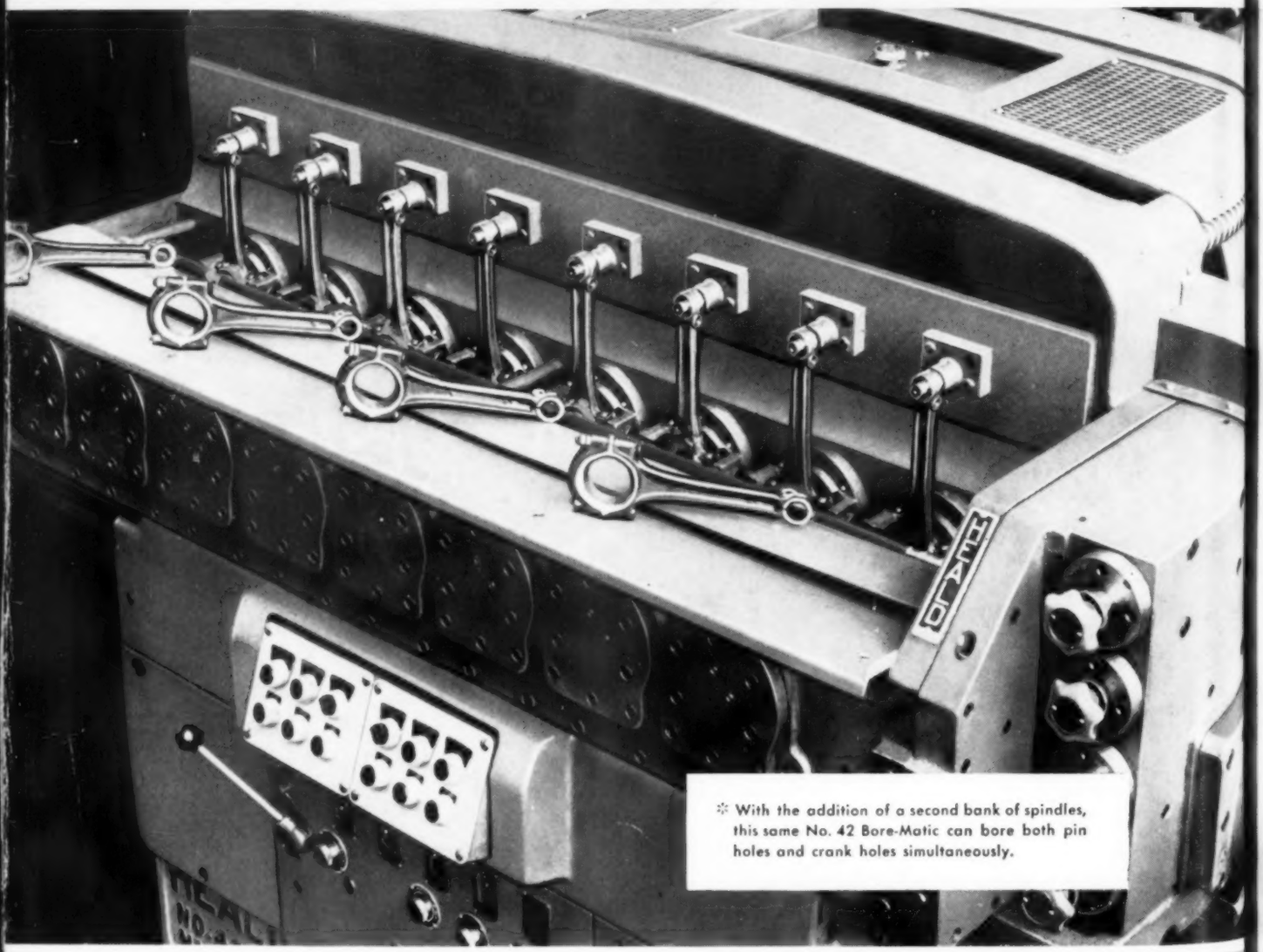

* With the addition of a second bank of spindles, this same No. 42 Bore-Matic can bore both pin holes and crank holes simultaneously.

INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINES

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

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Clips and QUIPS

Spray Packaging . . . With an ordinary paint spray gun this automatic wire-stitching machine gets a durable, long-term package of plastic. Our cover Kodachrome was taken in the spray room of the R. M. Hollingshead Corp., Camden, N. J. Material being sprayed is a modified polyvinyl resin, carried in volatile solvents and called Cocoon. The use of colors in the solution enables the operator to get a uniform coat over the previously formed web. Use of the process in shipping tools is described in pictures in this issue as well.

3-Phase Reconversion . . . Landers, Frary & Clark had an unusual problem —and opportunity—in reconverting two buildings from war products to peacetime production. Several million dollars were invested in the changover, under competent industrial engineers. Included are the newest methods for pickling before porcelain enameling, for enameling itself, and the latest for cleaning and baking synthetic enamels. In the latter case, building limitations got in their licks. The story is told in our lead article.

Does Labor Labor? . . . Much has been written and said about the reported decline in the productivity of production labor since the VJ Day. In one group of interviews we found, for example, that productivity had declined in every case but one. In two other cases, productivity had shown an increase to pre-war levels or better when men returned to work after lengthy strikes. Chief Editor Finney discusses the problem and some solutions in the special report in this issue.

Ball-Point Production . . . Newspapers and general magazines have been crowded with the controversy over who makes the first, the best—and now the cheapest—ball-point pens. The monthly outputs titillated our production bump, so we investigated at Eversharp. The first part of the result is the spread of Shop Shots in this issue; another installment comes February 13.

Hello . . . Talking on the telephone is frequently profitless, but it did result in our discovery that golf irons can now be matched within a fraction of an ounce. MacGregor is making a single blank for irons from 2 to 9, then broaching to dimensions. Production savings occur all over the place—as you'll see in our report.

Good Things . . . We offer more of the good things in January *A.M.* with the second installment of Mr. Aller's Air Gaging, the third of Mr. Reilly's welding setups. . . . John Mayo also puts in some pointed paragraphs to remind users not to strangle pneumatic tools by neglecting supply lines.

Who's Upset? . . . It took phone calls, telegrams and pleading, but the story of the upset forging methods used by A. C. Sparkplug on the pull rod is presented herewith. Le Grand had to change his story at the last minute to incorporate latest die changes.

Coming . . . *A.M.* for Feb. 13 really steps out. . . . We begin a 4-article series on quality control, show how Hotpoint uses turntables to advantage in dishwasher assembly (if your wife gets ideas, you're responsible), give the details on making 3-dimensional models, on nitriding tool steel, and on high production setups at Buick. . . . There are other articles on air contamination and boiler welding, plus a prize special report on drawing compounds. Sam Spring of Frankford Arsenal authored the latter—and we took it gladly—some in rough notes, some typed and some as dictated cylinders. You catch a busy expert when and as you can if you want the real lowdown. And from what we can discover from press builders, the major factor in tremendous increases in drawing speeds these last few years is the improvement in lubricants.

MULTI-MILER . . . Ben C. Brosheer, associate editor of *American Machinist*, who is based in Chicago, was born in a farmhouse just outside of Independence, W. Va., 41 years ago. Lived in Virginia, Kentucky, California, etc., before being graduated from high school in 1922. Went to Westinghouse as a machinist apprentice (journeyman, 1926), became a time study man and later machine-tool demonstrator in the department handling appropriation, selection and purchase. Meantime graduated in 2½ years from the 4-year Westinghouse Technical Night School engineering course and later attended night classes at Carnegie in engineering and economics.

He left Westinghouse in 1935 for 1½ years as time-study man at Hookless Fastener (now Talon, Inc.), then came to *American Machinist* in September, 1936. He became an associate editor in 1939, and in these past ten years has traveled 140,842 business miles to dig out articles.

BEVEL GEAR *Design? Manufacture? Application?*

WE OFFER YOU:

1. SOLUTIONS OF YOUR BEVEL GEAR DESIGN PROBLEMS,
2. ESTIMATES OF YOUR PRODUCTION TIME AND COSTS,
3. RECOMMENDATIONS ON THE RIGHT EQUIPMENT FOR YOUR NEEDS,

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Highly skilled engineers backed by a wealth of experience in bevel gear design and manufacture will study your bevel gear drive designs, make suggestions, estimate production time and costs, and recommend the correct bevel gear manufacturing equipment.

Utilize the complete Gleason Engineering Service by sending us:

For production engineering: (1) Blueprints of your bevel gear designs, (2) Material specifications and manufacturing tolerances, (3) Quantity of gears to be produced per month, and (4) Number of working hours per month available for gear production.

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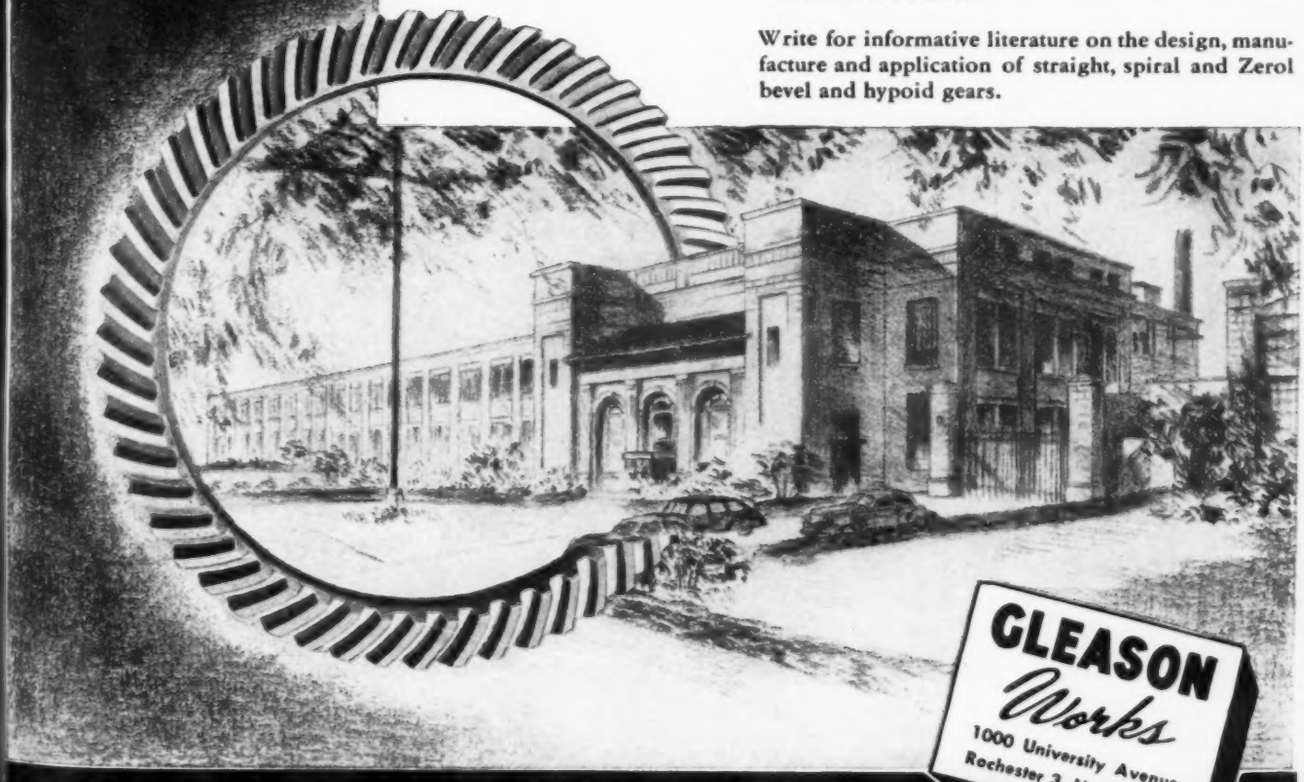
Write for informative literature on the design, manufacture and application of straight, spiral and Zerol bevel and hypoid gears.



GLEASON *Works*
1000 University Avenue
Rochester 3, N.Y., U.S.A.

Builders of Bevel Gear Machinery for Over Eighty Years

"ROBOT PILOT"

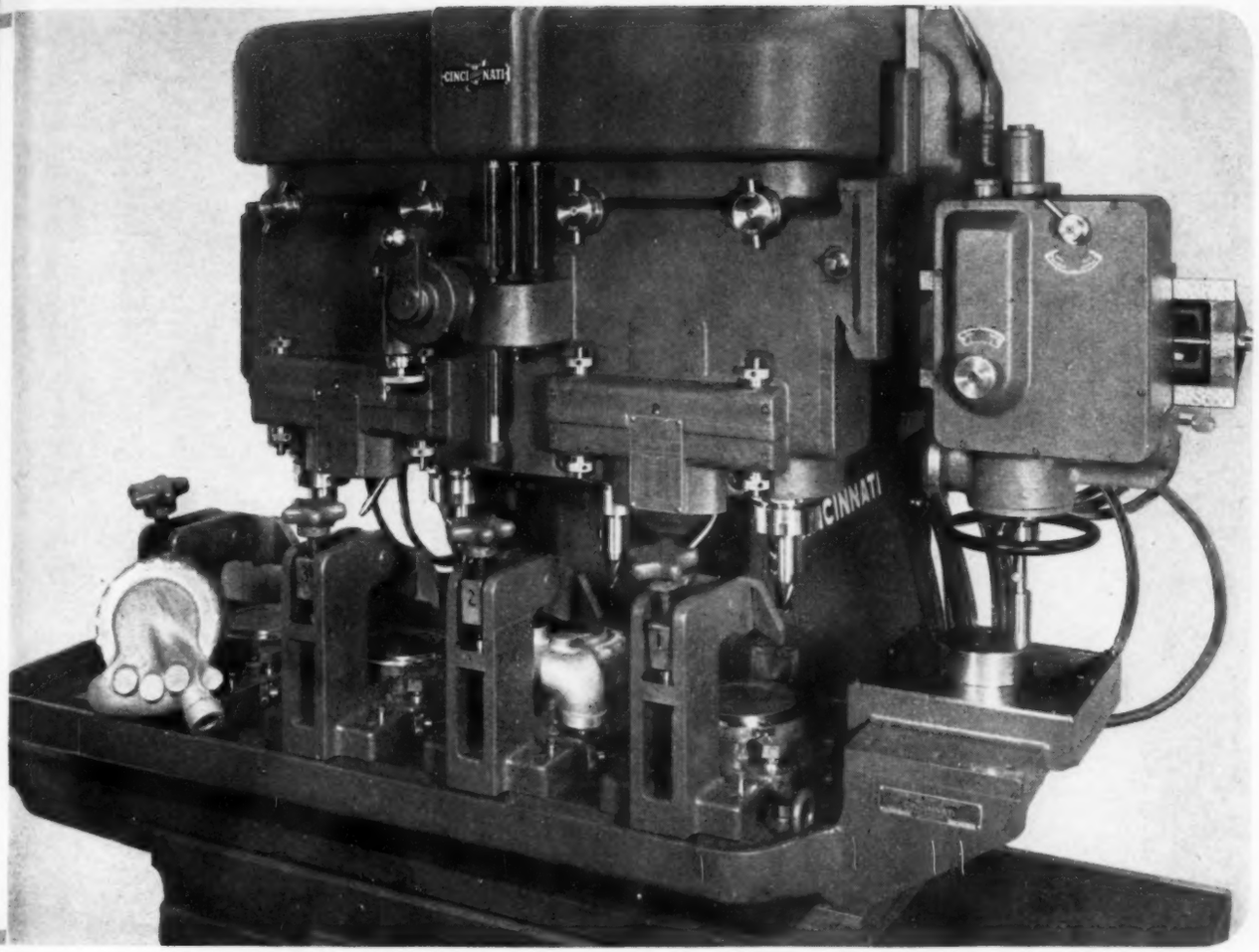
GUIDES FOUR CUTTERS to automatically profile mill four parts in one cycle

The automatic pilot in an airplane has a wingless counterpart in the automatic profiling unit on CINCINNATI Four-Spindle 360° Automatic Profiler. Irrespective of the profile to be milled, whether it be circular, reverse curves like the letter "S", or radial fingers like those on a clutch plate, the profiling unit (to the right of the machine) automatically scans the outline of a template, and the cutters follow exactly the same path. The operator does not guide or otherwise control the machine in any respect during the cutting cycle, yet he has complete manual control, if the need should arise. ¶ The machine in the illustration on the opposite page was tooled up by Cincinnati Application Engineers to profile mill the semicircular pad on distributor housings. Four parts are milled at one time. The operator loads and unloads the fixture and adjusts the cutters to the work, and then the automatic profiling unit takes over. ¶ A review of your milling operations will undoubtedly uncover many profile milling jobs that can be performed at a substantial saving on CINCINNATI Four-Spindle 360° Automatic Profiling Machines. Catalog M-1215 will help you decide, and our Application Engineers will help you study your problem.

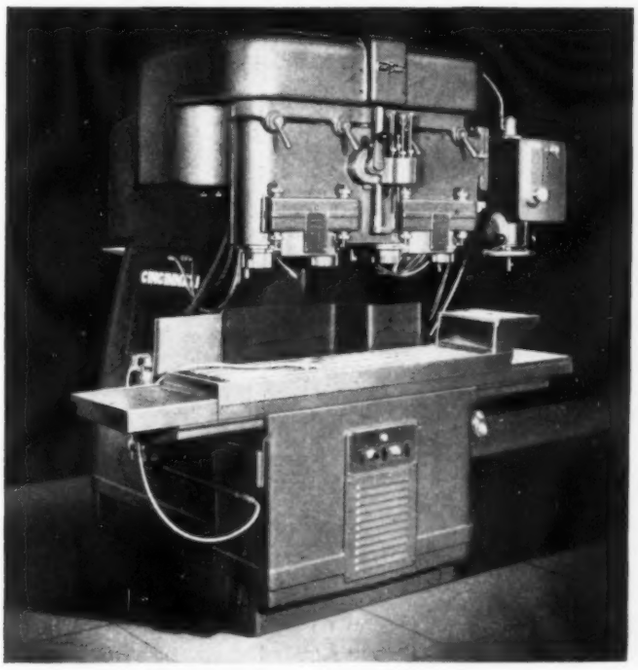
Part Name — Distributor housing (illustrated above) (Milled surface in color)
Material — Aluminum
Operation — Rough and Finish profile mill pad
Production — 32 per hour
Machine — CINCINNATI Four-Spindle 360° Automatic Profiler

THE CINCINNATI MILLING

MILLING MACHINES



Above: A CINCINNATI Four-Spindle 360° Automatic Profiling Machine set up for profile milling four distributor housing pads in one cycle. No. 2 fixture has been loaded, others show construction.



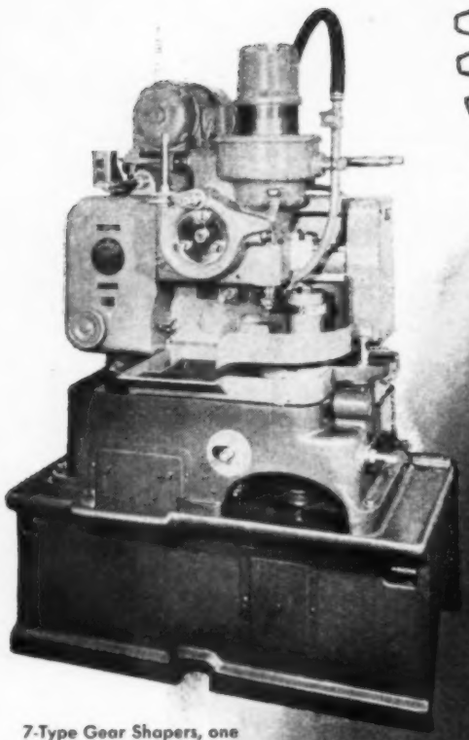
At the right is a full view of the CINCINNATI Four-Spindle 360° Automatic Profiling Machine for internal and external profile milling operations. Catalog M-1215 contains complete specifications.

MACHINE CO.

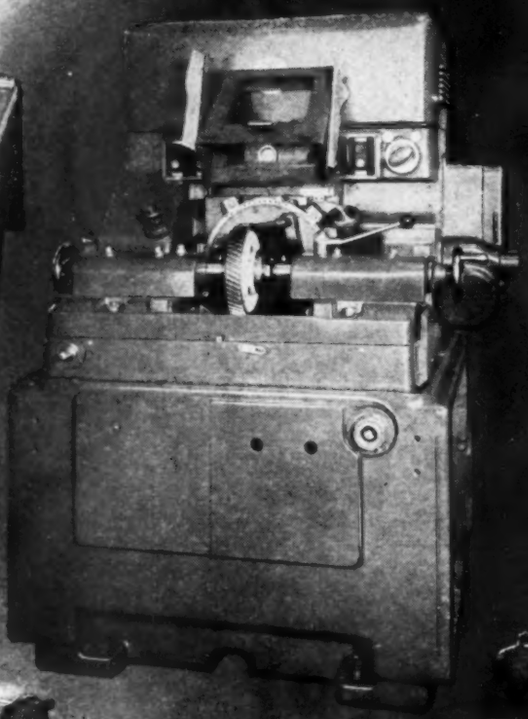
CINCINNATI 9, OHIO, U. S. A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

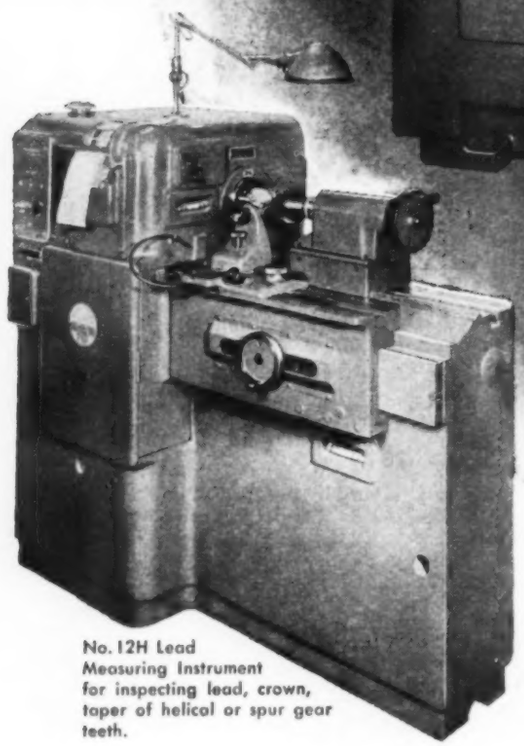
GEAR PRO



7-Type Gear Shapers, one of several types for Cutting and Pre-Shaving.



No. 12 Gear Shaving Machine, one of a complete line of machines for Gear Shaving.



No. 12H Lead Measuring Instrument for inspecting lead, crown, taper of helical or spur gear teeth.

No. 12 Involute Measuring Instrument for checking involute profiles

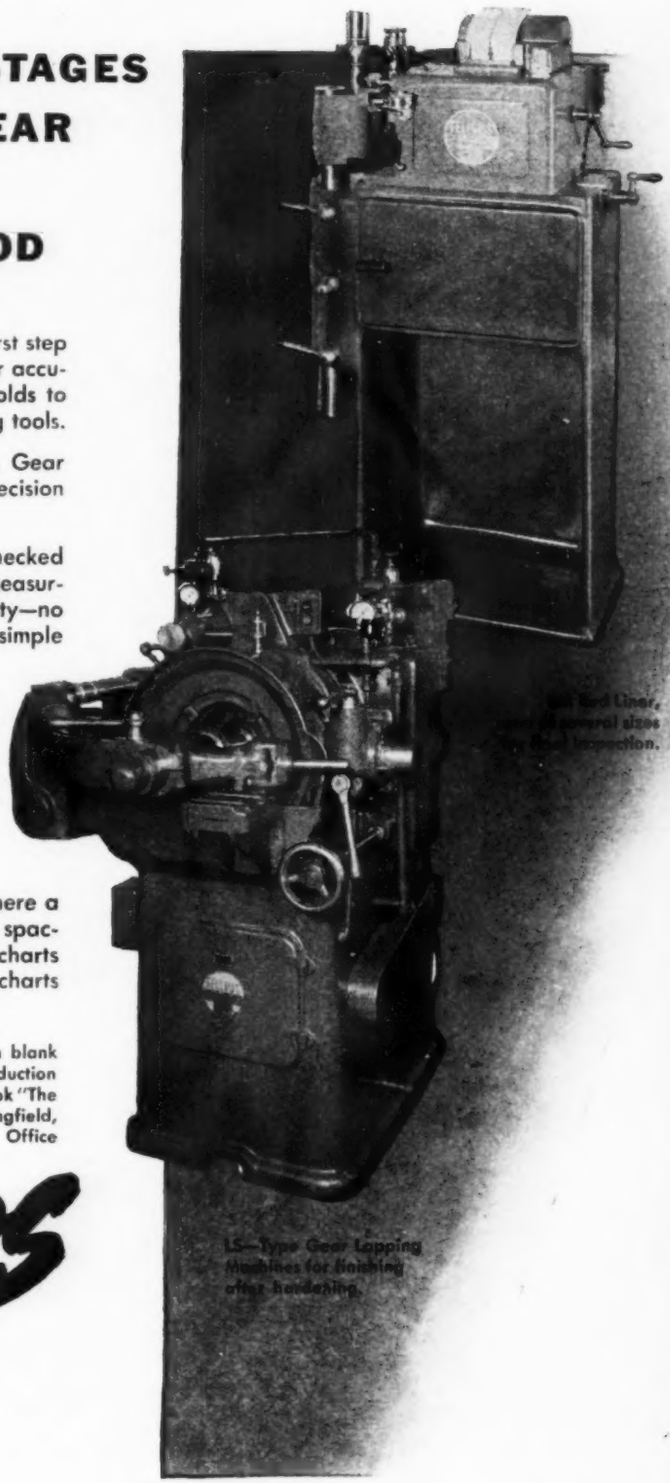
● **GOVERNMENT SURPLUS MACHINE TOOLS:** We are licensed under the **WAR ASSETS ADMINISTRATION** to act as dealers in the disposal of Government Surplus Machinery. Those interested in obtaining such machinery should contact our Main Office, Springfield, Vt.; or our offices in Detroit, Mich. and Chicago, Ill.

DUCTION *in Balance*

FROM BLANK THROUGH ALL STAGES TO FINISHED GEAR ...by the FELLOWS METHOD

- In the Fellows Method of balanced production the first step is the cutting or pre-shaving operation. Gear Shaper accuracy in pre-shaving saves on overall costs, as it holds to limits, which increase the life of ultra-precise shaving tools.
- The rapid finishing of gear teeth on the Fellows Gear Shaving Machine maintains a high degree of precision with correspondingly smooth finish.
- Involute profiles and profile modifications can be checked and recorded at all stages on the Fellows Involute Measuring Instrument. Valuable time is saved by its simplicity—no base rolls, sine bars or calculations. Likewise, the simple checking of the helix of helical gear teeth—the crowning and taper of helical and spur gears—is accomplished on the Fellows "Lead" Measuring Instrument.
- After hardening, the Fellows Lapping Machine provides an economical means of restoring original accuracy, as well as correcting cumulative errors normally developed in hardening.
- Final inspection is made on the Fellows Red Liner where a combination check is obtained on concentricity, tooth spacing, tooth shape, and close-limit backlash. Red Liner charts along with Involute Measuring and Lead Measuring charts can be retained for a *complete* inspection record.

Thus the Fellows Method controls high-production accuracy from blank to finished gear. Consult the Fellows Sales Engineer on your production problem or write for your copy of our 64 page illustrated book "The Fellows Method". The Fellows Gear Shaper Company, Springfield, Vermont...or 616 Fisher Bldg., Detroit...or 640 West Town Office Bldg., Chicago.



LS—Type Gear Lapping Machines for finishing after hardening.

Red Liner, several sizes for final inspection.

Fellows

In one setting...

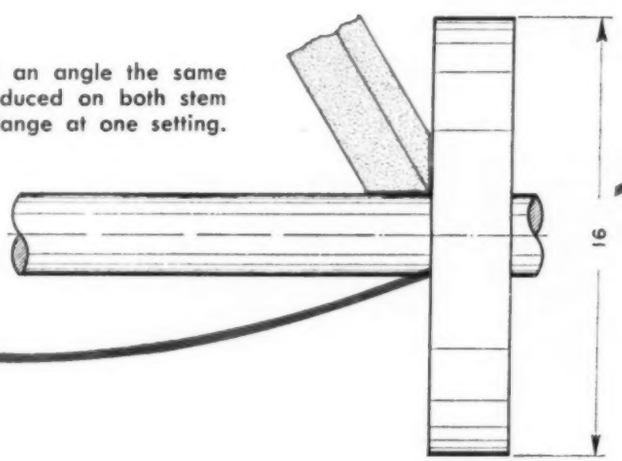
CINCINNATI FILMATIC

GRINDS FACE OF LARGE DIAMETER FLANGE

(up to 16″)

AND SMALL DIAMETER BODY

With grinding wheel at an angle the same high-grade finish is produced on both stem diameter and face of flange at one setting.

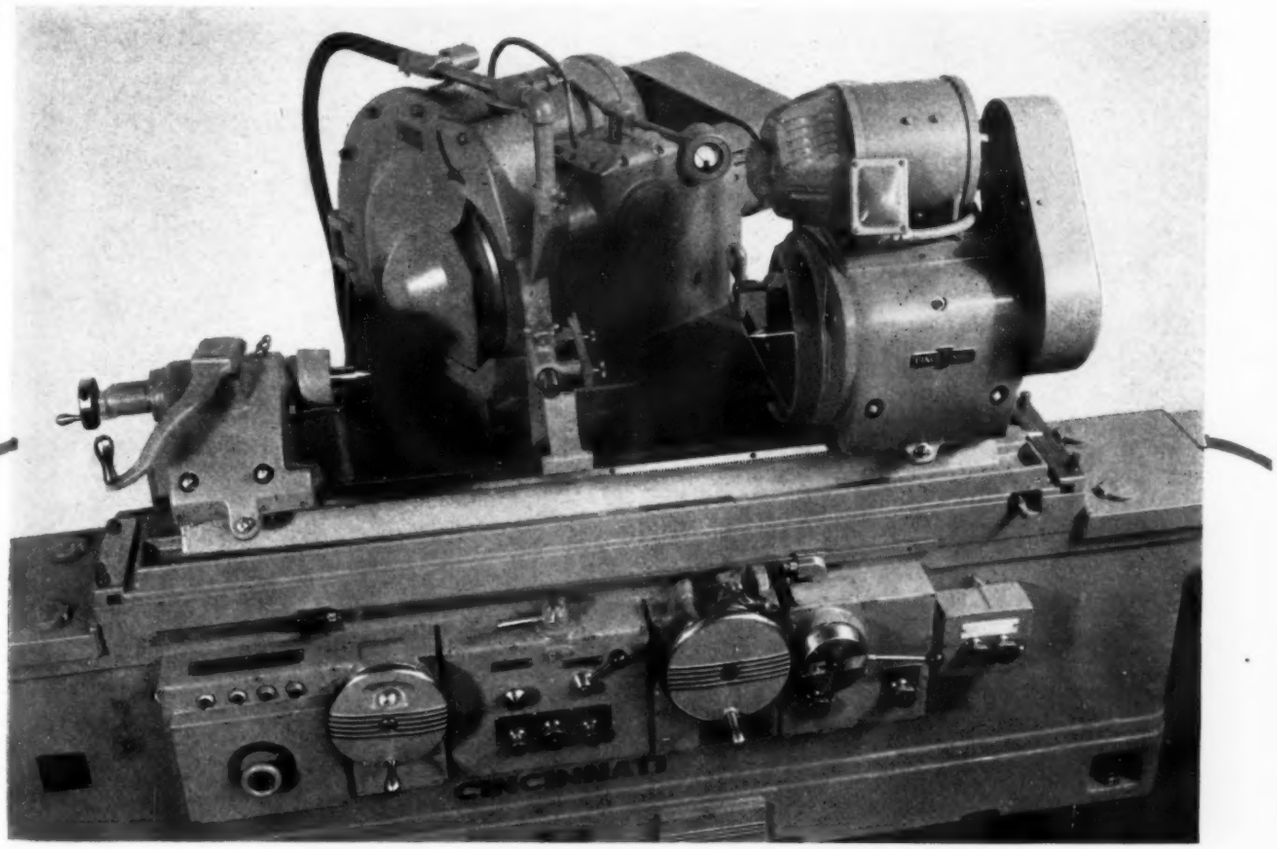


CINCINNATI

CINCINNATI GRINDERS

CENTER TYPE GRINDING MACHINES

It's no trick to grind the diameter and the face of an adjoining flange when there's not much difference in size, but when the ratio increases to four or five, then additional problems must be overcome. The machine illustrated here—a semistandard CINCINNATI FILMATIC Angular Wheelhead Grinder—grinds the body diameter of the part, and at the same setting, the face of an adjoining flange up to 16" diameter. Starting with a stripped down CINCINNATI FILMATIC 10" Plain Hydraulic Grinder, Cincinnati Application Engineers added the following units: right-hand headstock raised to swing 16" diameter; left-hand raised footstock with latch type retraction of center; 30° angular wheelhead raised to grind 16" diameter work; 5" hydraulic cross traverse at a grinding rate. The machine handled the job perfectly, accurately sizing the stem diameter while producing a high-grade finish on the face of the flange at the same setting. ¶ Perhaps you could use this type of equipment to advantage for some of your cylindrical grinding operations. Why not talk it over with our Application Engineers?



The angular wheelhead is mounted on a CINCINNATI FILMATIC 10" Plain Hydraulic Grinding Machine. Notice that the headstock and footstock have been transposed so that the thrust is against the headstock unit.

INCORPORATED CINCINNATI 9, OHIO, U. S. A.

• CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

Gives

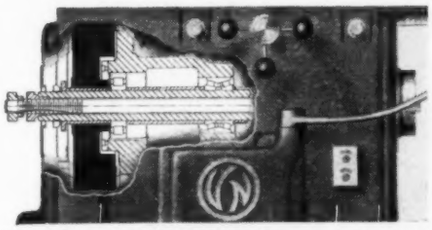
VAN NORMAN

No. 2 HEAVY

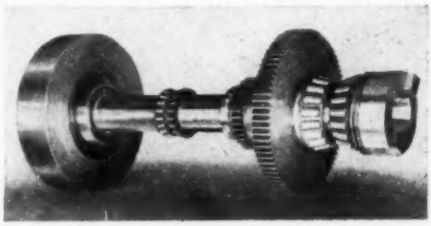
Horizontal Milling Machine

You 4 Outstanding Features

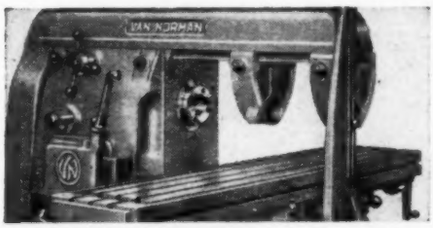
That Improve Cutability, Simplify Operation, Increase Production



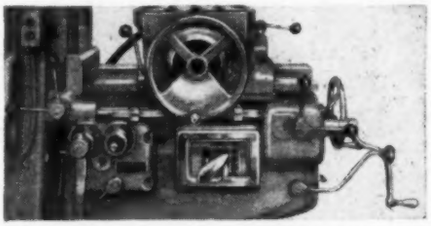
BUILT-IN SPINDLE FLYWHEEL, mounted inside the column, assures uniform uninterrupted transmission of power to cutter. The heavy flywheel increases and improves cutability . . . permits smoother finish of work surface.



5 ANTI-FRICTION BEARINGS support the large diameter alloy steel spindle. They maintain accuracy by assuring maximum spindle strength and rigidity under every type of cut.



EASE OF SPINDLE CONTROL is assured with single lever feed selector and convenient spindle reverse. Spindle clutch lever for starting and stopping spindle is quickly adjusted to most convenient operating position.



FRONT AND REAR CONTROLS of finger-tip power and six-way rapid traverse levers and manual adjustments simplify operation . . . reduce worker fatigue. Directional power controls provide maximum work and operator safety.

Look into the Van Norman No. 2 Heavy for general purpose and production milling. This heavy, rugged, highly efficient machine will give maximum quality service, increase production, lower costs on a wide variety of applications. Available with plain or universal saddle. Write for information.

VAN NORMAN COMPANY
SPRINGFIELD 7, MASSACHUSETTS

For Accuracy — Flexibility

LANDMACO
THREADING
MACHINE

LANDIS
REG. U.S. TRADE—MARK PAT. OFF.

THREAD CUTTING MACHINES • PRECISION THREAD GRINDERS

THREAD CUTTING DIE HEADS • COLLAPSIBLE AND ADJUSTABLE TAPS

—*Speed* In Thread Production

The LANDMACO Threading Machine is a precision tool capable of handling many threading operations much more economically than the heretofore slower and therefore more expensive methods.

It has many new and exclusive features which combine to assure the greatest possible degree of accuracy, ease of operation, and flexibility in making set-up changes.

The 1" and 1½" Single Head LANDMACO Threading Machine illustrated is also made in double and quadruple spindle models. The LANDMACO is also made in 2" and 2½" sizes in single and double spindle models.

The Lanco Thread Cutting Die Head, using the Landis Long Life Tangential Chaser . . . acclaimed "The Finest Thread Cutting Tool in Industry" . . . is standard equipment on the LANDMACO Threading Machine.

Write for Bulletin H-75

THE LANDIS CHASER

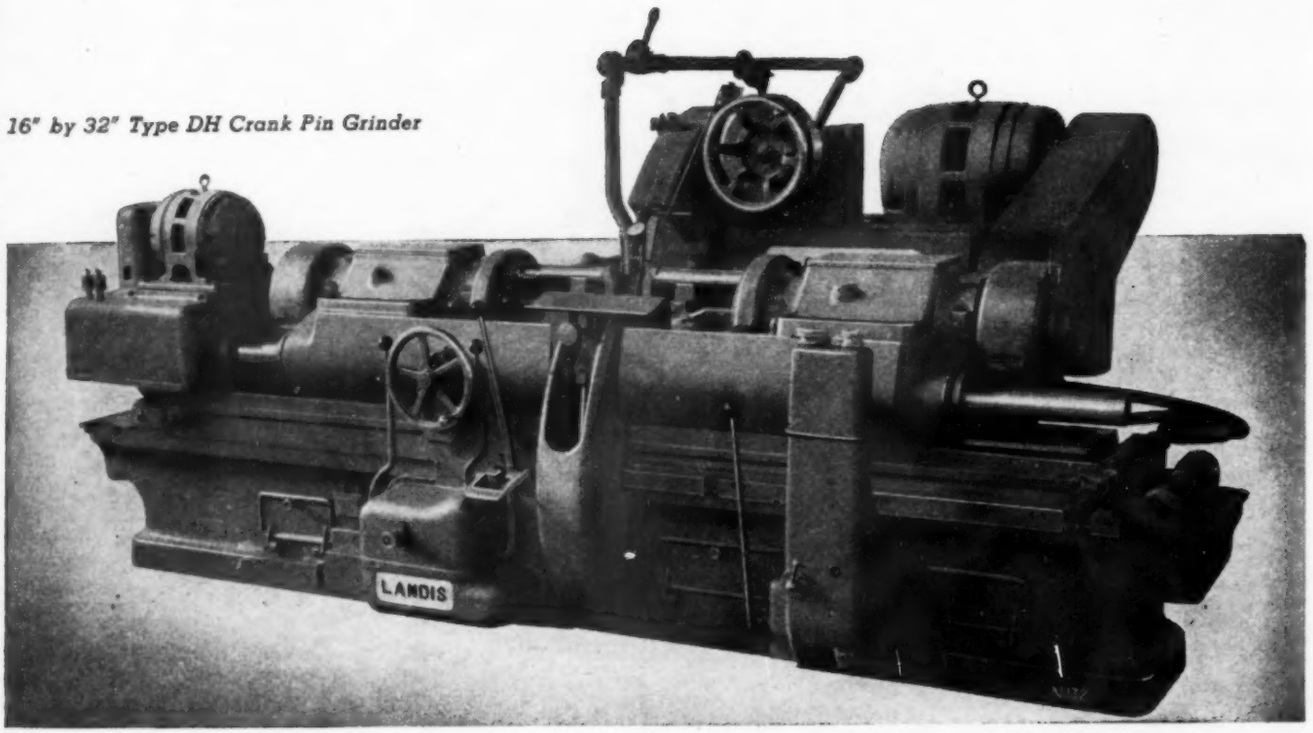
- Single pulley drive
- Self-contained selective type gear box provides eight spindle speeds
- Flood lubrication for all gears and bearings
- Gear type pump direct driven and automatically reversible
- Built-in pump can be removed without disconnecting any piping
- Motor-in-base affords compact and efficient motor drive
- Friction clutch control
- Head opens and closes automatically
- Hand lever for opening and closing head
- Semi-steel bed of box type reinforced by inner walls
- Minimum die head overhang
- Adjustable vise easily lined up with spindle
- Oil reservoir lubricates guides through felt pads in carriage base
- Gibbed carriage compensates for wear
- The heavy rim of vise handwheel, giving flywheel effect, facilitates gripping of work
- Guards completely cover and protect guides

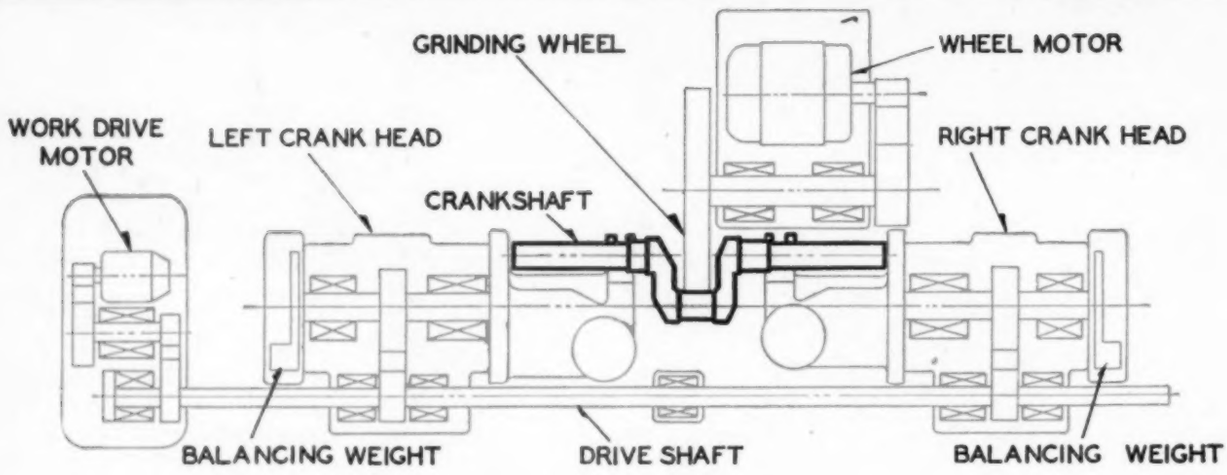
LANDIS MACHINE COMPANY

WAYNESBORO · PENNA · U·S·A·

How 6 Different

16" by 32" Type DH Crank Pin Grinder





Simplified plan view showing chief features

LANDIS TOOL

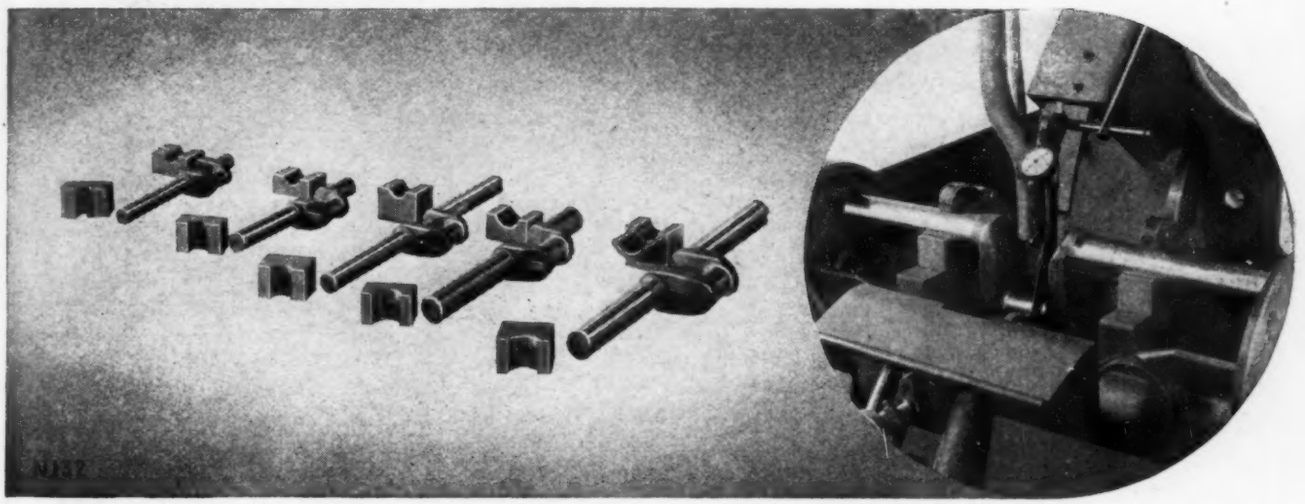
Precision Grinders

LANDIS TOOL COMPANY

Crankshafts were Ground

on the Same Machine

THE PROBLEM — Grind Pins on These Six Shafts



THE SOLUTION

By LANDIS TOOL Engineered Grinding Service

Interchangeable Throw Blocks. Hydraulically operated clamps lock crank in grinding position. Other pin sizes ground on same machine using interchangeable throw blocks for various throws.

Grinding crank pins for six different throws was the problem of an engine builder. Since production runs did not justify separate machines, Landis Tool grinding engineers suggested interchangeable clamping blocks to hold the various throws in the crank carrying fixture. Readily accessible and quickly adjustable balancing weights make possible rapid shift from one size crankshaft to another with little loss of production time.

Your grinding problem may involve cylindrical, centerless, internal, shoulder, face, taper, or centerless thread grinding. In any event, Landis Tool Engineered Grinding Service will help you to a cost cutting solution at minimum investment. Write us details of your grinding problem. 57

WAYNESBORO, PA.

LANDIS TOOL *Company*

ACME TURRET LATHES MAINTAIN *Exceptional*

★ ACCURACY
HIGH SPEED
LOW COST ★

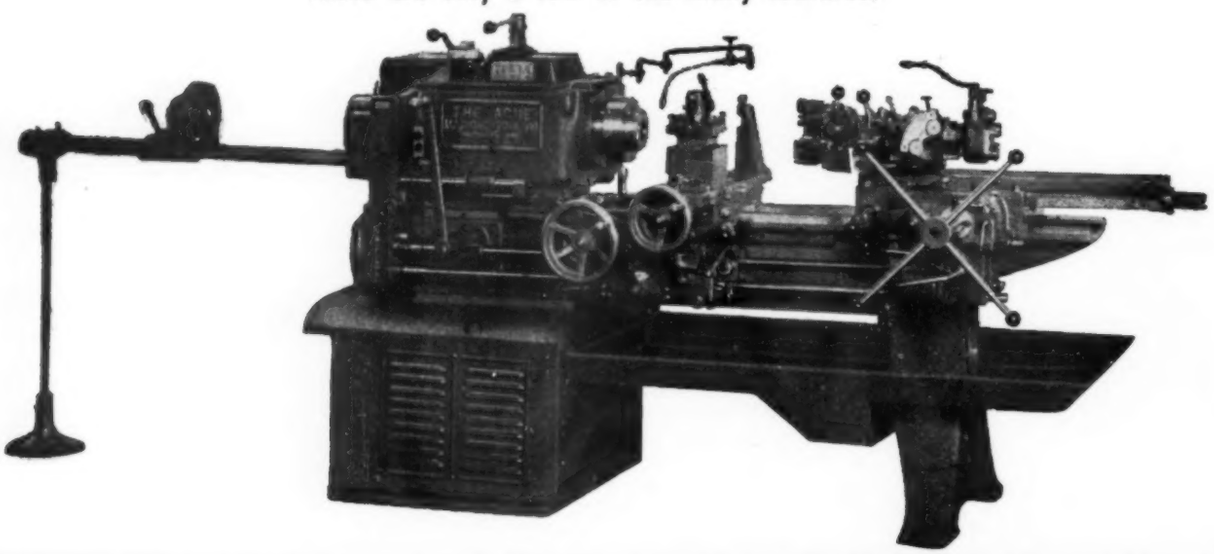
THIS Acme Ram Type Turret Lathe is fitted with Automatic Chuck and screw bar feed. It is also equipped with chasing attachment for cutting from 4 to 32 threads per inch. This attachment is extra and furnished only when required.

This type machine will accommodate round bar stock up to 2" on the No. 5R machine, and up to 2½" round stock on the No. 6R machine.

All of the most important features necessary to maintain accuracy and speed at low cost are incorporated in this design which includes:

- Hardened steel vees on bed.
- Hardened steel ram slide bearings.
- Triple roller spindle bearings.
- Twin nut back lash eliminator on cross screw.
- Non-overhanging headstock.
- Side carriage apron taper gibed to front bearing on bed.
- Independent feed ranges for either apron.

These are only a few of the many features.



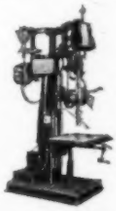
The ACME MACHINE TOOL Co.
CINCINNATI 32, OHIO

THE FINEST DRILL PRESSES MADE BEAR THE CANEDY-OTTO NAME

6-SPINDLE 21" BOX COLUMN SLIDING HEAD FLOOR DRILL

14" No. 3000 F.V. 1-SPINDLE SENSITIVE FLOOR DRILL

16" No. 3000 F.V. 1-SPINDLE BOX COLUMN FLOOR DRILL



21" BOX COLUMN SLIDING HEAD FLOOR DRILL

4-SPINDLE 21" BOX COLUMN SLIDING HEAD FLOOR DRILL

16" No. 5-10,000 B.V. 2-SPINDLE BENCH DRILL

2-SPINDLE 21" BOX COLUMN SLIDING HEAD FLOOR DRILL

World's Most Complete Drill Press Line

Fine engineering *plus* quality construction *equals* finer performance. And you get it all in a drill press that carries the CANEDY-OTTO trade-mark. Around the world, the finest drill presses made bear the CANEDY-OTTO name. So before you buy, check the CANEDY-OTTO Catalog — the one source from which you can buy *ALL* your standard drill press needs.

CANEDY-OTTO MFG. COMPANY, Chicago Heights, Ill.

Have The Canedy - Otto Catalog On File For Ready Reference

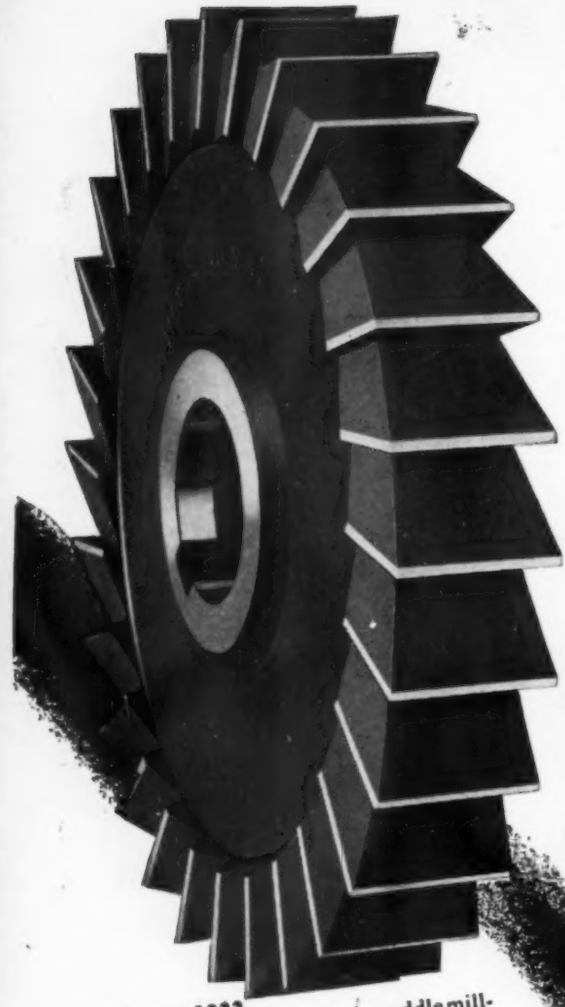
Canedy-Otto Mfg. Company
Chicago Heights, Illinois
Please send illustrated catalog. (Insert No. 90)

NAME .....

ADDRESS .....

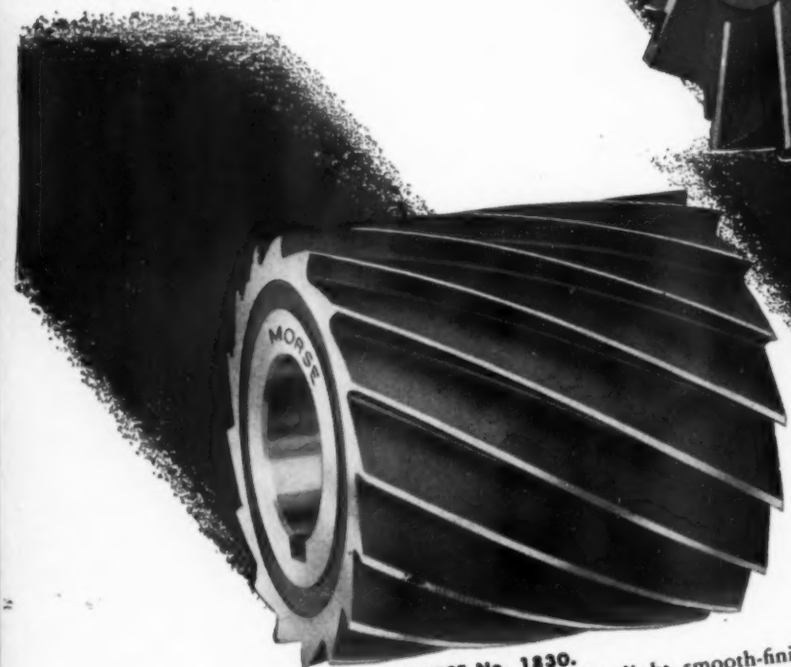
MORSE

that

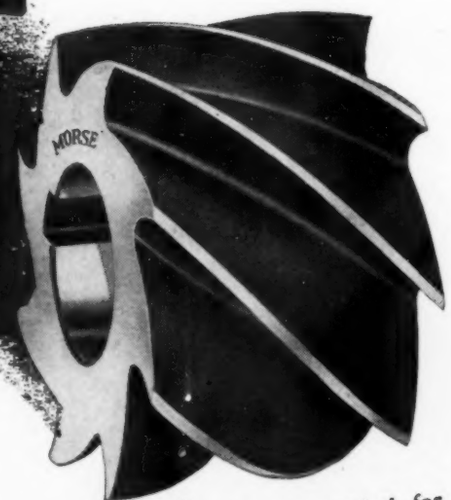


MORSE No. 1833.
Side Milling Cutter—For general straddle milling, slotting, and side milling.

MORSE No. 1809.
Alternate Tooth Side Milling Cutter—For deep slotting, keyway, and heavy-duty milling. Teeth of alternate right and left hand spiral provide shearing action and eliminate side thrust. Cutting action is smooth and rapid.



MORSE No. 1830.
Plain Milling Cutter—For light, smooth-finish cuts in cast iron, malleable iron, and steel. For slabbing work which is narrower than the cutter.



MORSE No. 1802.
Heavy-Duty Plain Milling Cutter—Ideal for heavy cuts where considerable stock is to be removed.

Makes the Cutters

Make the Most of Time

Morse Milling Cutters are designed to make the most of time by giving *maximum* performance on each job. The result of over 80 years of experience, Morse Cutters are noted for their *consistently long life, smoothness of cut,* and *high return per sharpening.*

Milling Cutters of all kinds are available from Morse. Besides those shown, Morse can supply you with Angle, Convex and Concave Cutters, Woodruff Keyseat and Involute Gear Cutters, as well as any of the other high quality cutting tools in the complete Morse line—End Mills, Reamers, Taps, Dies, and Drills.

Maximum Cutter performance depends upon many factors and only when *all* these are known can the proper Cutter be selected. You can derive the benefit of our experience by letting Morse help you in the selection of the proper Cutter for *your* job. Your Industrial Supply Distributor will cooperate in securing a Morse recommendation.

Accuracy, Quality, Uniformity: the MORSE Code of Cutting-Tool Manu

MORSE TWIST DRILL & MACHINE COMPANY

The Original Manufacturer of Twist Drills

NEW BEDFORD, MASSACHUSETTS

NEW YORK STORE: 130 LAFAYETTE ST. • CHICAGO STORE: 570 WEST RANDOLPH ST. • SAN FRANCISCO STORE: 1180 FOLSOM ST.

Doing Cylindrical Grinding?

LET NORTON GRINDERS DO IT FOR YOU ON A *Cost-Reducing Basis!*

MAXIMUM productivity, ease of operation and control, and enduring precision equip the NORTON Cylindrical Grinder to meet the demands of mass production — "More volume at lower cost".

The machines shown here — ranging from the compact 4" Type C to the massive 16" Type C — are typical of the thousands of Norton Cylindrical Grinders that are already cutting costs in hundreds of plants.

Individual catalogs are available on the 4", 6", 10" and 14-16" Type C's,

including special catalogs on the 6" and 10" Semi-automatics. Also available is a condensed catalog — #1843 — describing the entire line of Norton Grinding and Lapping Machines.

NORTON COMPANY, WORCESTER 6, MASS.

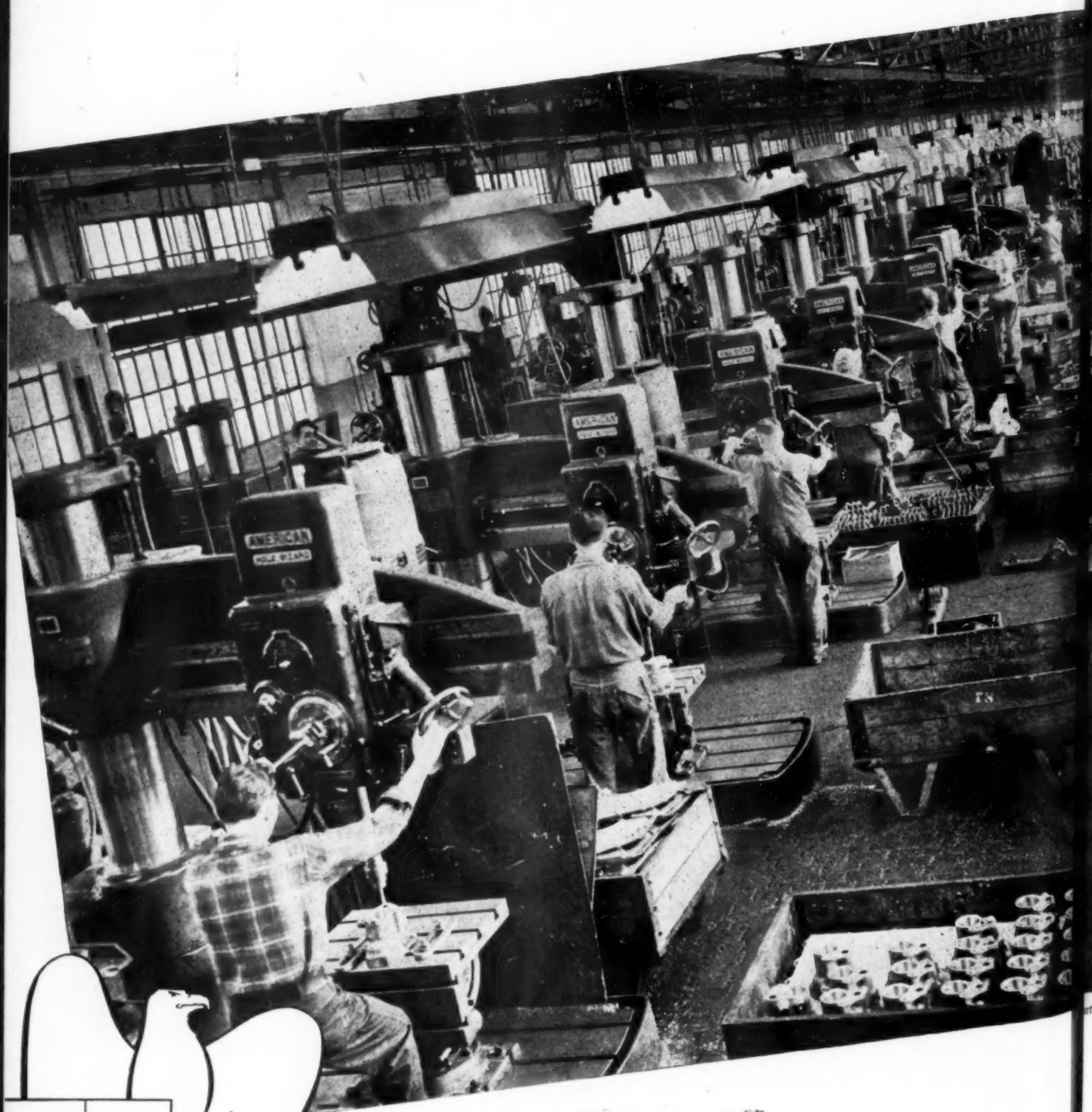
New York - Chicago - Detroit - Cleveland Hartford

Distributors in All Principal Cities

M-534

NORTON GRINDERS *and Lappers*

TEAMWORK



THE AMERICAN TOOL WORKS C

K FOR PROFIT

...tesy of Fairbanks, Morse & Co.

Quality Tools produce a Quality Product . . .

Fairbanks, Morse & Co., one of the world's leading manufacturers of Electrical Equipment and Diesel Engines, uses scores of "American" Hole Wizard Radial Drills to produce quality at a profit.

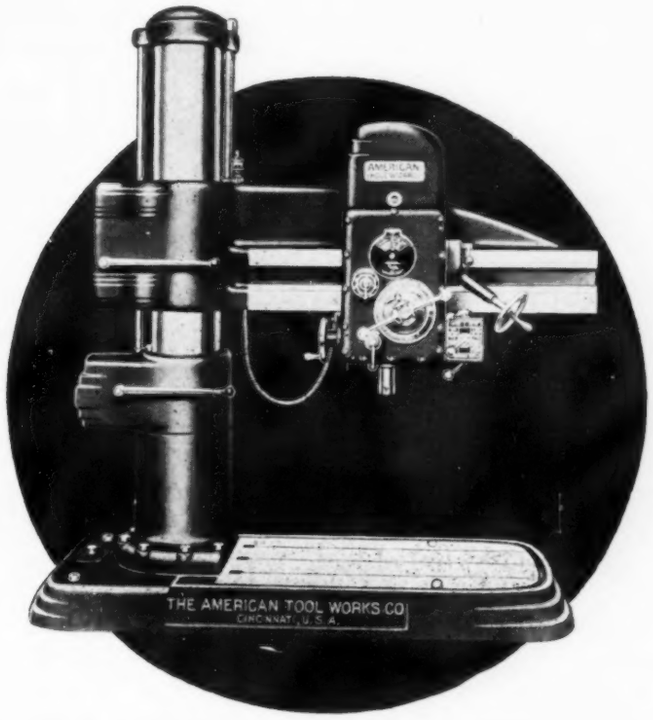
The smooth operation and easy handling of "American" Radials give them front rank recognition amongst users as dependable producers of accurate and finely finished work.

The directly connected, head mounted motor guarantees maximum power at the spindle.

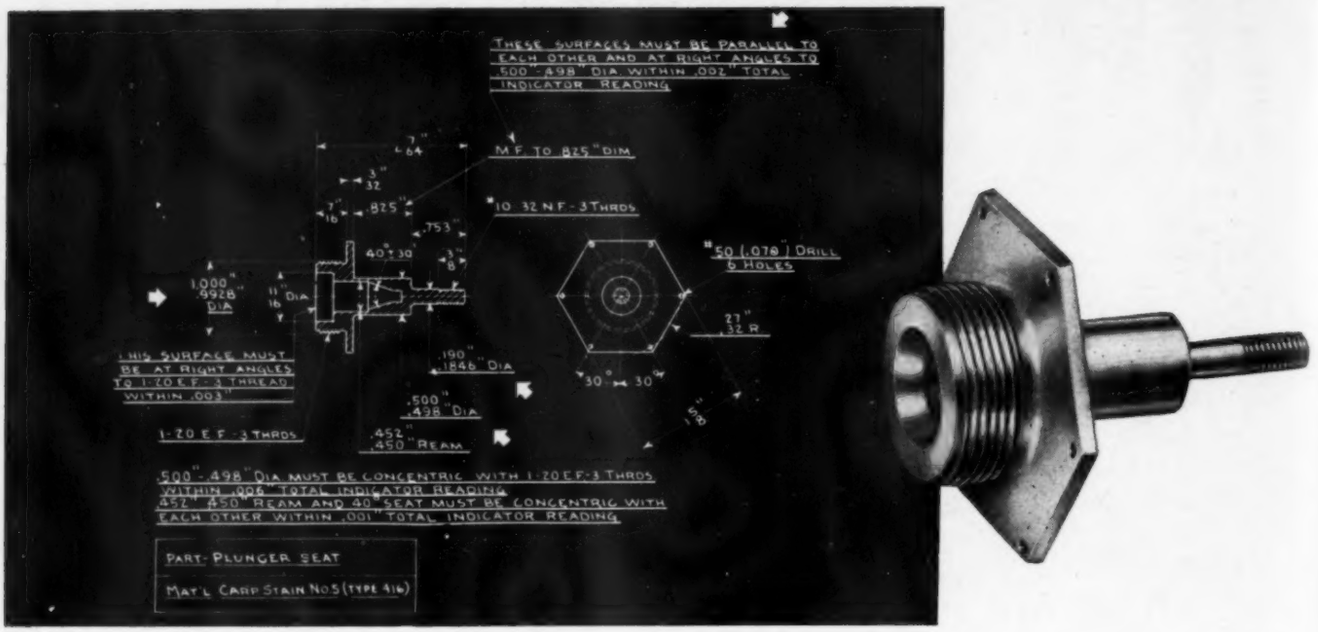
Finger-tip and direct-reading controls insure speedy manipulation for greater work production.

Anti-friction mounting of head on arm and convenient location of all operating levers mean less operator fatigue and more work at day's end.

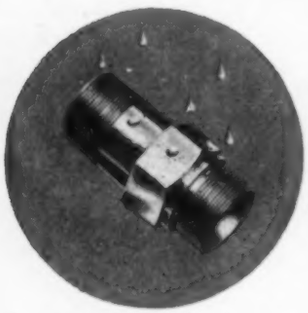
For quality work at a profit your best bet is "AMERICAN".



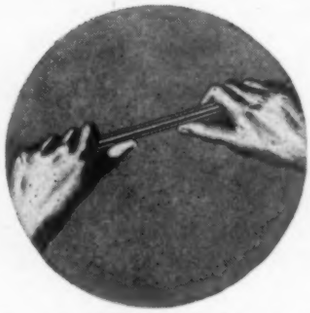
...thes and Radial Drills **Cincinnati, Ohio U.S.A.**


THESE SURFACES MUST BE PARALLEL TO EACH OTHER AND AT RIGHT ANGLES TO .500"-.498" DIA WITHIN .002" TOTAL INDICATOR READING
M.F. TO .825" DIM
10-32 N.F.-3 THRDS
.50 (.070") DRILL 6 HOLES
1.000" .9928" DIA
11/16" DIA
40°±30'
.27" .32 R
30° 30°
.190" .1846" DIA
.500" .498" DIA
.452" .450" REAM
1-20 E.F.-3 THRDS
THIS SURFACE MUST BE AT RIGHT ANGLES TO 1-20 E.F.-3 THREAD WITHIN .003"
.500"-.498" DIA MUST BE CONCENTRIC WITH 1-20 E.F.-3 THRDS WITHIN .006" TOTAL INDICATOR READING
.452"-.450" REAM AND 40° SEAT MUST BE CONCENTRIC WITH EACH OTHER WITHIN .001" TOTAL INDICATOR READING
PART-PLUNGER SEAT
MAT'L CARP STAIN NO 5 (TYPE 416)

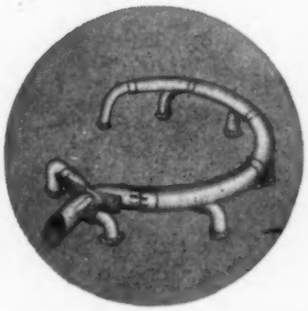
Look at the Advantages you get with *Carpenter* Stainless



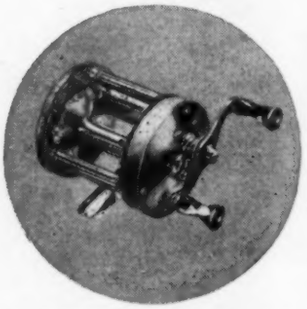
Corrosion Resistance that gives your products more durability, greater dependability, is one of the things you get with Carpenter Stainless.



Strength and Rigidity is an important design consideration in hundreds of light weight products made from Carpenter Stainless.



Heat Resistance for continuous or intermittent service is another advantage that Carpenter Stainless gives you.



Gleaming Sales Appeal is "automatically" a part of your products when they are made from Carpenter Stainless

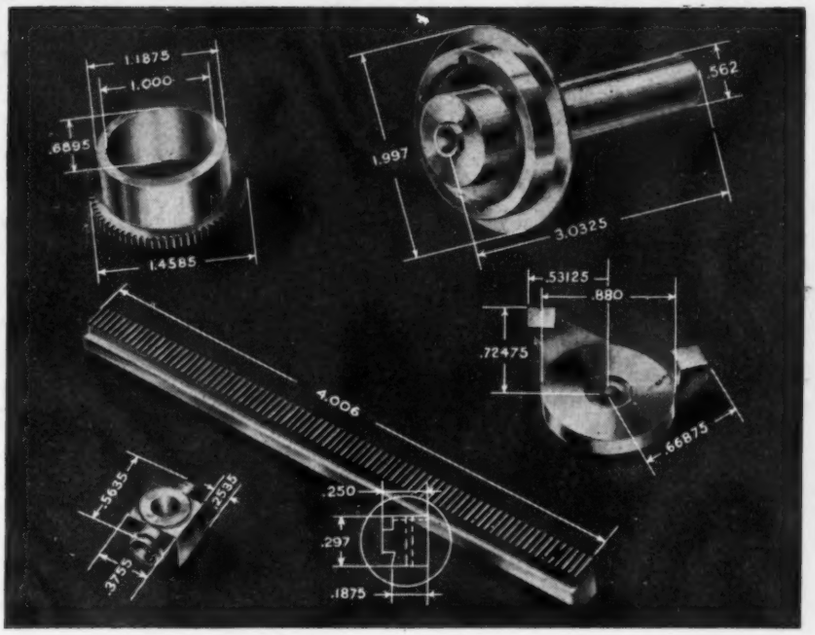
On jobs where Stainless is used to improve product performance or to give you new sales features, there are good reasons why your first choice should be Carpenter Stainless. You can count on the fact that each lot will behave perfectly in your machines, help you cut production costs and eliminate rejects.

And just as important, you can get this Stainless right out of your nearby Carpenter warehouse stocks. If you are not already one of the many who are saving dollars by using Carpenter Free-Machining Stainless . . . send in your order today. Just call your nearest Carpenter warehouse.

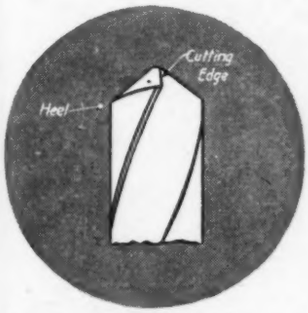
Carpenter **STAINLESS STEELS for**

Strength
Rigidity
Heat Resistance
Corrosion Resistance
Longer Product Life
Sales Appeal

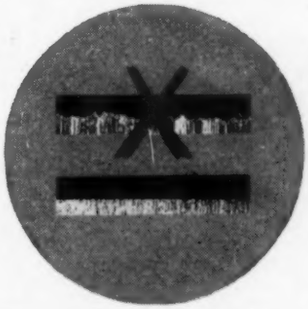
It's really no trick at all to turn out close tolerance Stainless jobs at a profit when your orders specify *Carpenter* Free-Machining Stainless bar stock.



...Here is the Know-How of Fabricating Stainless



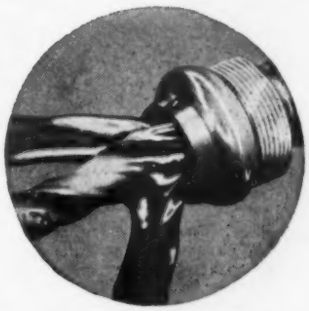
How to double-check your tool grinding on each job.



Why stoned edges produce better finishes and last longer.

Surface Feet per minute (Low and High)	Approximate Feed
80/115	.003/.008"
40/80	.003/.008"
80/110	.003/.008"
40/60	.003/.008"

How correct speeds and feeds save time and money on every job.



How proper lubrication cuts machining costs.

Start today to put Carpenter's diversified Stainless experience to work on each and every job. You can do it by calling in your nearby Carpenter representative. Ask him for the new Carpenter "Notebook on Machining Stainless Steels." He will be glad to give personal copies of the NOTEBOOK to Production and Management Executives. And after you have it, if you want additional copies for the men in your plant, they are available at 50c apiece. Drop us a line today.

THE CARPENTER STEEL COMPANY, 109 W. BERN ST., READING, PA.

Carpenter

FREE-MACHINING

STAINLESS STEELS

more than corrosion resistance

PROMPT SHIPMENT FROM CONVENIENTLY LOCATED STOCKS

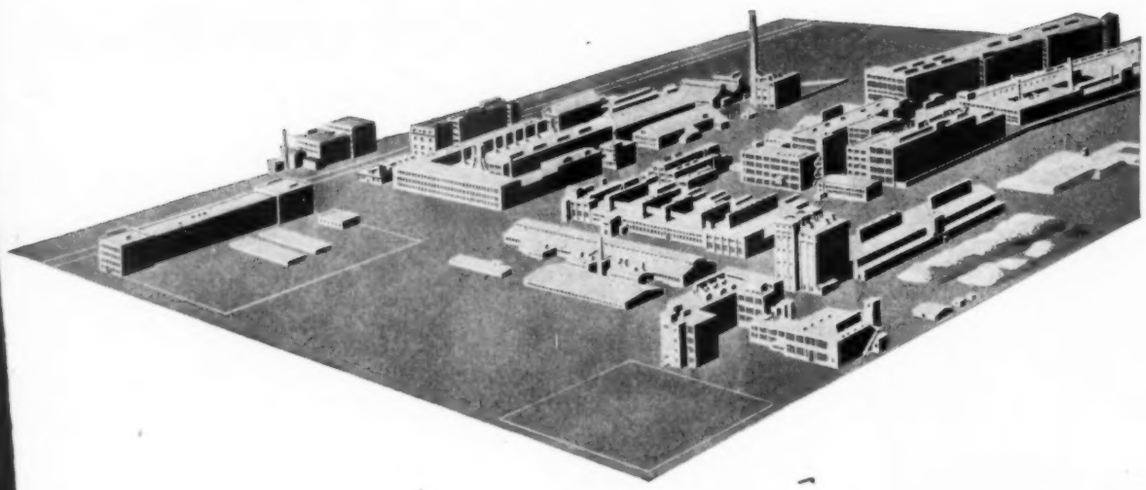
Buffalo	Cleveland	Hartford	Philadelphia
Chicago	Dayton	Indianapolis	Providence
Cincinnati	Detroit	New York	St. Louis

SEE THE CLASSIFIED SECTION OF YOUR TELEPHONE DIRECTORY

A BUYING GUIDE FOR ABRASIVES

POINT No. 1

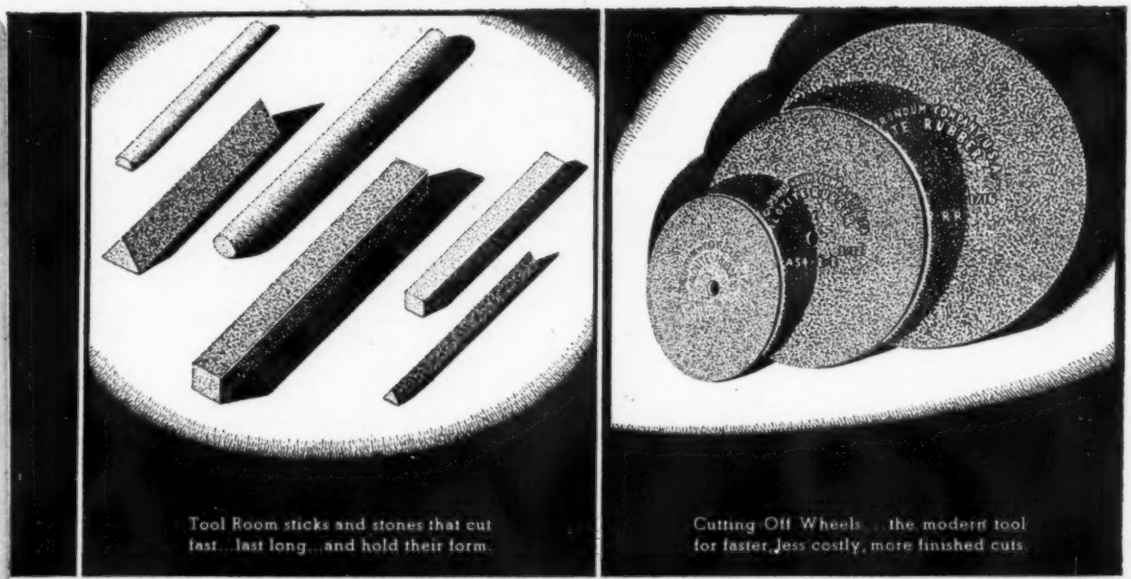
MANUFACTURING RESOURCES



It is understandable to anyone in Production that better manufacturing resources generally lead to a superior product. Quality is not to be had for the mere wishing. The vast manufacturing facilities of The Carborundum Company are known to be an important part of the nation's industrial picture, and are pointed to as being in the forefront of manufacturing and technical progress. Not the least of the reasons for the satisfying, uniform, and dependable quality of Abrasives by CARBORUNDUM are the spacious, modern, alert and efficient manufacturing facilities which produce those abrasives. The Carborundum Company, Niagara Falls, N. Y.

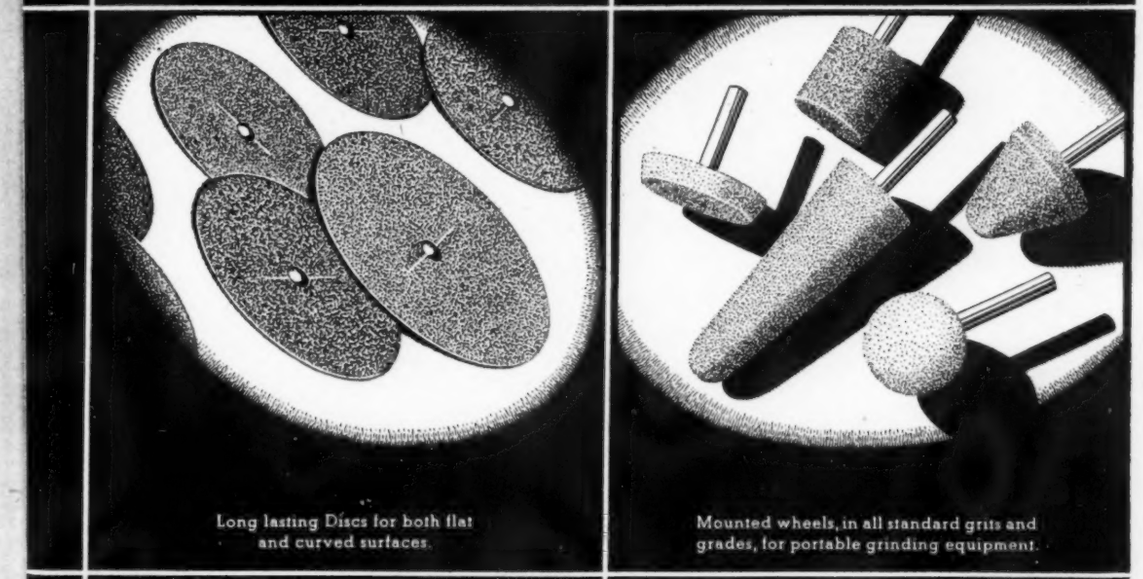
CARBORUNDUM

A Good Rule for Good Grinding



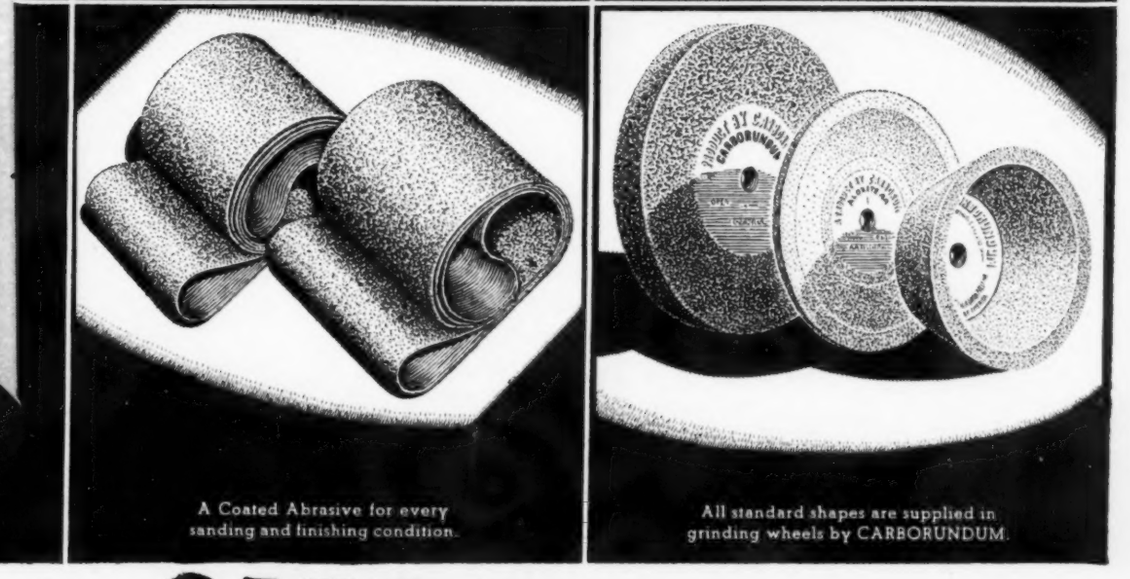
Tool Room sticks and stones that cut fast... last long...and hold their form.

Cutting-Off Wheels . . . the modern tool for faster, less costly, more finished cuts.



Long lasting Discs for both flat and curved surfaces.

Mounted wheels, in all standard grits and grades, for portable grinding equipment.



A Coated Abrasive for every sanding and finishing condition.

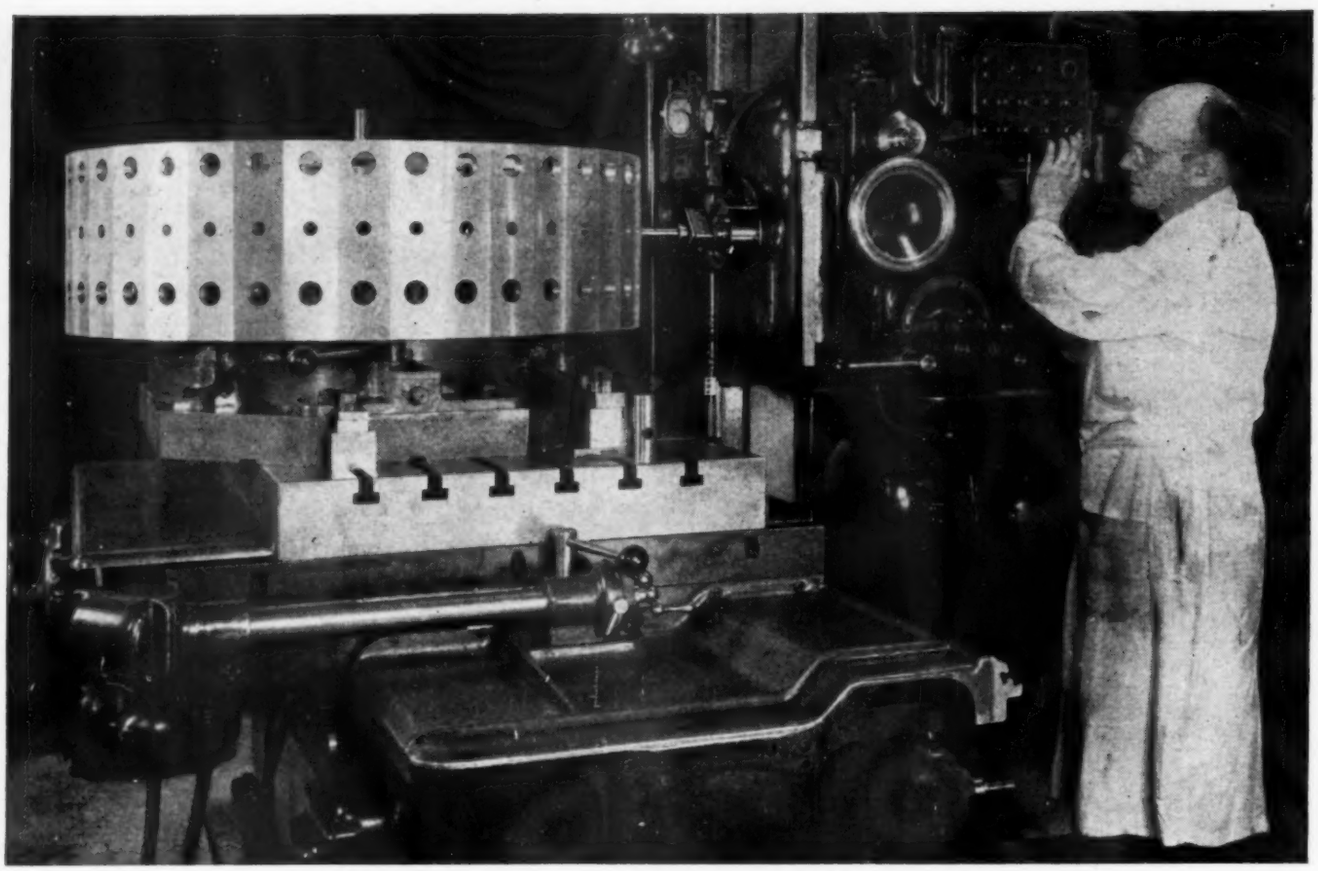
All standard shapes are supplied in grinding wheels by CARBORUNDUM.

. . . CALL IN CARBORUNDUM

TRADE MARK

● BONDED ABRASIVES ● COATED ABRASIVES ● ABRASIVE GRAINS AND COMPOUNDS

Milled, Drilled and Finish Bored Complete on the 3-B DEVLIEG JIGMIL !



Total machined tolerance: .0002"!

Total JIGMIL time: 133.7 hours!

The large aluminum casting shown above is a typical example of the JIGMIL work being done at Ed Simonds' and Carl Frostholm's progressive Beaver Machine and Tool Company, Syracuse, N.Y. A rotor for a spoon forming machine, the casting was machined complete to an over-all accuracy of .0002" (two ten-thousandths) by means of JIGMIL automatic push-button controls. Here's the sequence of JIGMIL operations:

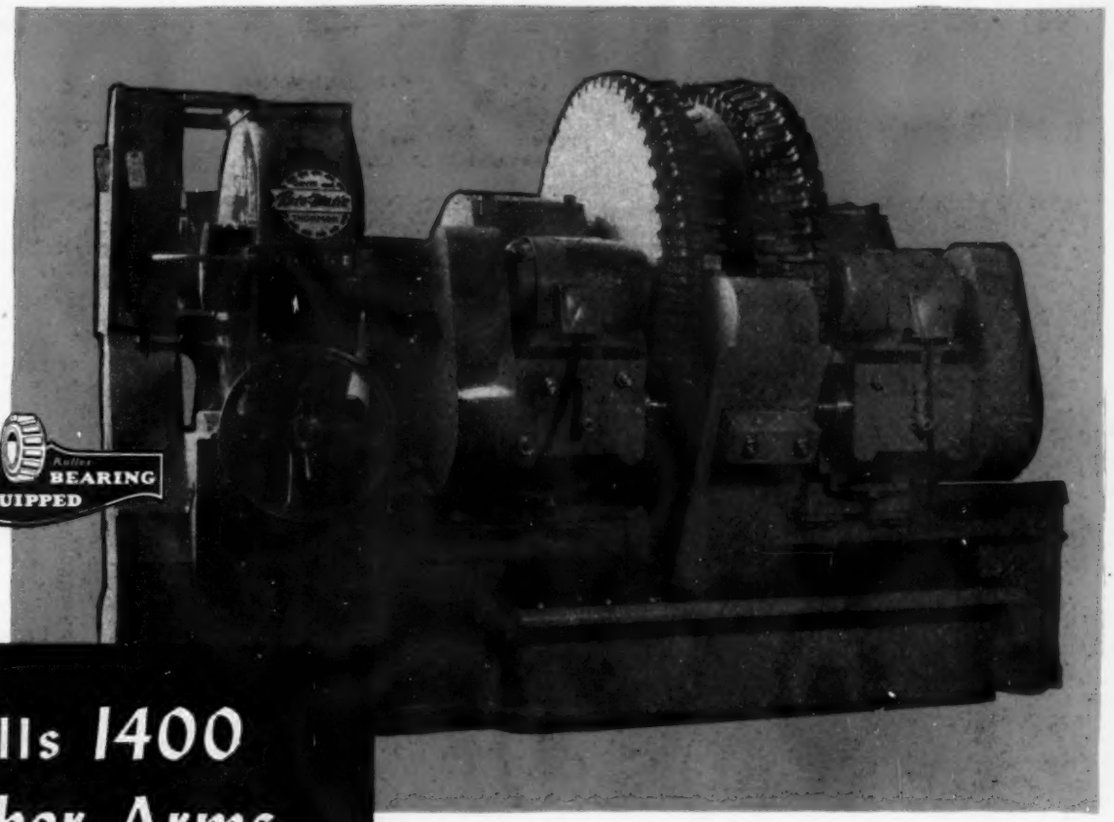
(1) Rebore center hole and cut keyway 3.3751" dia. x 14" long. Keyway 7/16" x 7/32" in center of rotor. (2) Mill 40 flats on O.D. 4½" x 14". (3) Finish bore 80 holes to 1.500" dia. (4) Finish bore 80 holes to .875" dia. (5) Finish bore 40 holes to .750" dia. (6) Mill all other pads (not shown above). Method of machining: Precision index table—index position every 9°. Total JIGMIL time to complete: 133.7 hours!

Technical literature describing JIGMIL design, construction and operation is available upon request. Write for your copy today!

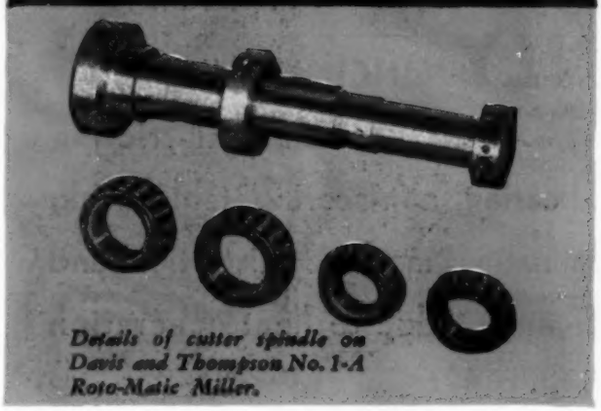
3-B DeVlieg JIGMIL

The world's finest JIG BORING and Milling Machine

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**



Mills 1400 Rocker Arms per hour with cutter spindles on TIMKEN BEARINGS



Details of cutter spindle on Davis and Thompson No. 1-A Roto-Matic Miller.

Davis and Thompson Co., Milwaukee, Wis., well-known exponents of "Tailored Production" in machine tools, use Timken Tapered Roller Bearings in their standard and special Roto-Matic equipment for the same reasons so many other heavy duty machine tool builders use them — to stabilize precision; increase speed; reduce operating and maintenance costs; and extend machine life.

The machine shown above is their basic No. 1-A Roto-Matic Milling Machine equipped with special heads arranged with 50 fixtures on each drum for the rough and finish milling of the radius on automobile engine rocker arms. A continuous chain toggle arrangement clamps the parts, leaving the operator free to load; unloading is automatic. Production, 1400 pieces per hour, gross. Roughing and finishing cutter spindles are mounted on Timken Bearings.

For rigid spindles, free from chatter at any speed, feed or cutting load specify Timken Bearing Equipped and look for the trade-mark "TIMKEN" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

CINCINNATI HYPRO VERTICAL BORING MILLS

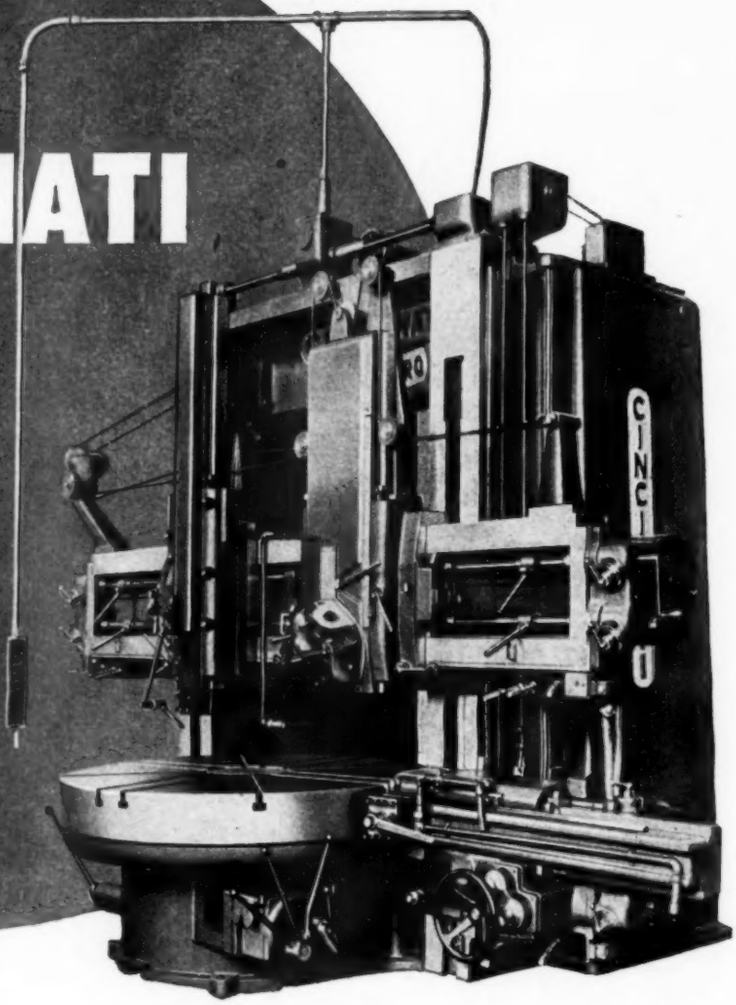


Table mounted on large center anti-friction tapered roller bearing and large diameter anti-friction bearing table track

When you specify an extra high table speed range on your vertical boring mill

ONLY CINCINNATI HYPRO gives you an anti-friction bearing, non-scoring *table track, eliminating machine distortion and misalignment due to heat generation

**Patent Pending*

THE CINCINNATI HYPRO PLANER COMPANY

PLANERS · BORING MILLS · PLANER TYPE MILLERS

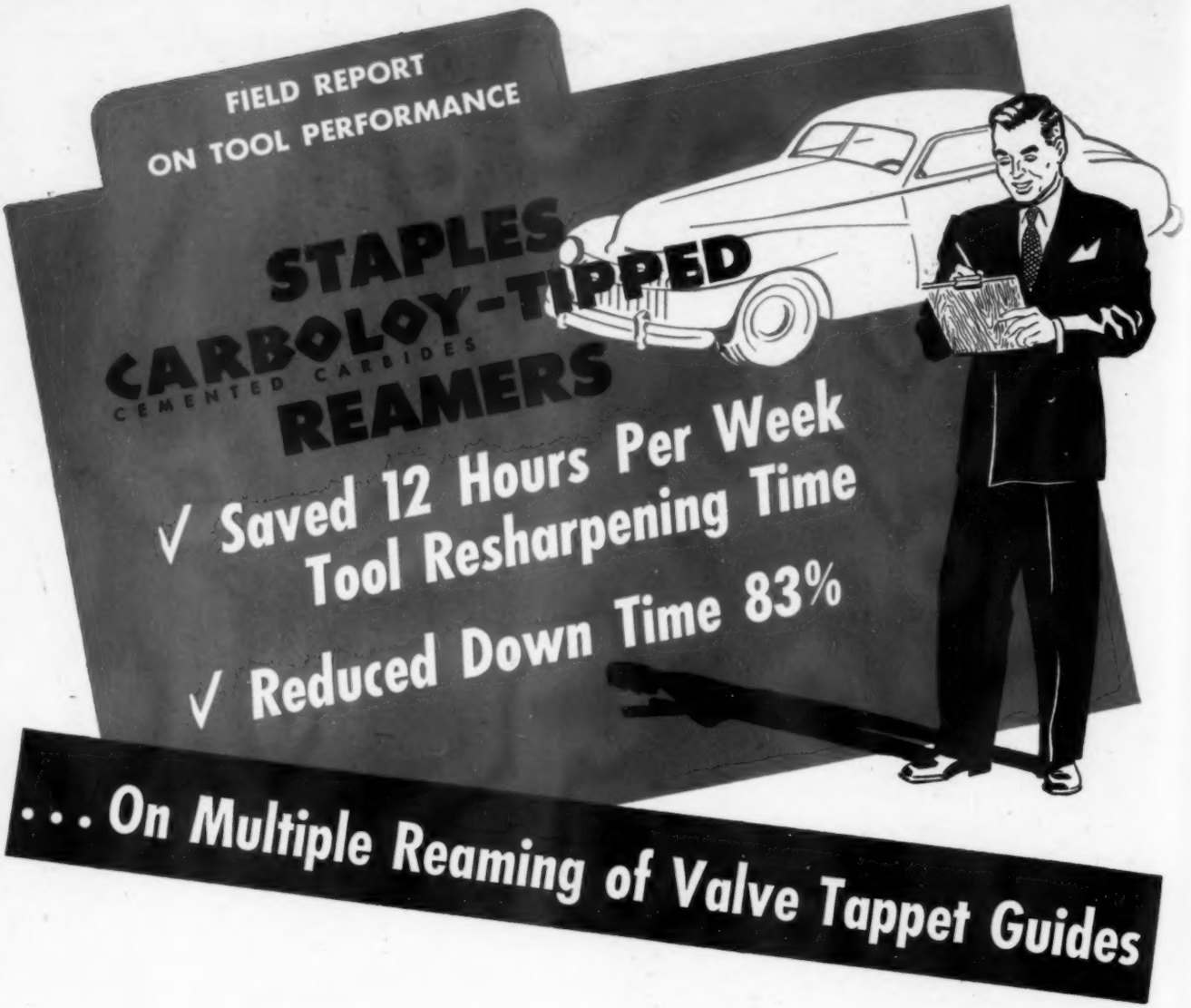
CINCINNATI, OHIO

Remember this...
THREADWELL TAPS ARE
1 machined
2 hardened
3 COLD-TEMPERED (at 120° below zero)
4 ground finished
5 flute-polished
6 greaseless rust-proofed
7 tested
8 inspected
9 "i-dot-ified"*
10 "tap-capsuled"**
—all for one purpose—to give you such outstandingly better threading service that you'll remember Threadwell every time you need a tap.
All the Threadwell distributor in your locality asks is that you give Threadwell Taps a try. He'll cheerfully stake his chances for re-orders on your size-up of their extra performance and convenience.
*Red dot on the shank to identify cut thread, white dot for commercial ground, blue dot for precision ground.
**Each Threadwell ground thread tap comes in an individual metal-capped, transparent plastic tube that protects it from dirt or damage and permits quick selection of type and size without unwrapping or handling.

DISTRIBUTORS IN LEADING
INDUSTRIAL CENTERS
THROUGHOUT THE UNITED STATES
AND THE WORLD

Threadwell
SINCE 1902
"TAPS OF DISTINCTION"

THREADWELL TAP AND DIE COMPANY • GREENFIELD, MASSACHUSETTS, U. S. A.
CALIFORNIA OFFICE, THREADWELL TAP & DIE CO. OF CALIF., 1322 SANTA FE AVE., LOS ANGELES 21



To ream valve tappet guide holes in cylinder blocks, an automotive manufacturer used a multiple tool set-up of six H.S.S. reamers. Eight hours running time was the maximum production rate possible before reamers became dull and required resharpening.

At the recommendation of Staples Tool Engineers, the six H.S.S. reamers were replaced with special Staples Carboloy-tipped Reamers. As a result, tool resharpenings were reduced from five times a week to *once a week!* Prior to this changeover, the manufacturer had accepted the high tool cost as a production necessity on jobs of this type.

By replacing H.S.S.tools with Staples Carboloy-tipped Tools on routine as well as complex hole cutting operations, many manufacturers have reduced tool costs, improved tool performance and have eliminated frequent down time. *Your* production may also benefit. Call in a Staples Tool Engineer for an on-the-job demonstration. There is no obligation.

THE STAPLES TOOL COMPANY
CINCINNATI 25 **OHIO**
Distributors in Major Cities

Staples CARBOLOY-TIPPED CIRCULAR CUTTING TOOLS
REAMERS • CORE DRILLS • SPOT FACERS • COUNTERBORES • END MILLS • SHELL END MILLS • ALSO A COMPLETE LINE OF CIRCULAR SPECIAL TOOLS

The CONE AUTOMATIC MACHINE COMPANY sees many GOOD THINGS AHEAD

It is reported that . . . . . .

Westinghouse calls its new steel encased motor the most revolutionary change in construction in 58 years and states that it delivers up to 134% more power per pound than previous motors.

get ready with CONE for tomorrow

Federal Telephone and Radio Corporation will conduct experiments with television, FM and radar in a building at Nutley, N.J., which will be completely shielded from atmospheric electricity.

be ready with CONE for today

Called the world's largest, a spot welder that can make 48 welds at a single stroke is in use at Pullman-Standard Car Manufacturing Co.

get ready with CONE for tomorrow

A division of Reynolds Metals Company has a new line of all-aluminum bicycles and scooters.

be ready with CONE for today

Raytheon Mfg. Co. has an electronic kitchen range. The food is put in a disposable dish and quickly cooked by the energy from a magnetron tube.

get ready with CONE for tomorrow

Bell Telephone Laboratories report that they have developed a tube that will send a hundred million words per minute by telegraph.

be ready with CONE for today

The Army Air Force has contracted with Fairchild Engine and Airplane Co. for fundamental research in the use of atomic energy in aircraft.

get ready with CONE for tomorrow

Aluminum Co. of America has recently supplied a 100-foot all-aluminum span for a railroad bridge at Massena, New York.

The Souhegan Mills of Wilton, N. H., believes that its molded board, made of shavings, can compete in price and utility with plywood or lumber.

be ready with CONE for today

The U. S. Bureau of Mines finds that Freon II is more effective in fighting gasoline fires than any of the other gases tested.

get ready with CONE for tomorrow

Patent 2,404,206 has been granted for a method of mining practically pure copper by dissolving it chemically and accumulating it electrolytically.

be ready with CONE for today

Nylon drive ropes are said by Plymouth Cordage Company to reduce machine shut-downs.

The behavior of piston rings and oil films has been studied by the National Advisory Committee for Aeronautics by using a glass engine cylinder.

get ready with CONE for tomorrow

When their new 2-million volt machine is installed, Babcock and Wilcox Co. will have 12 X-ray machines in use for checking steam generating equipment.

be ready with CONE for today

Blaw-Knox has built two 23-cubic yard clamshell buckets for unloading coal on Lake Superior. They weigh nearly 14 tons apiece and are believed to be the largest of their kind.

get ready with CONE for tomorrow

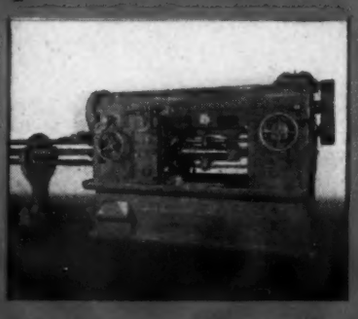
Scientific American prophesies that the use of silicones will bring about a revolution in surface finishes comparable to that resulting from the development of nitrocellulose lacquers.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

Give soft jobs to *any* Automatic

put the *tough* ones on a CONE

From 65 mm 3312 stock, a 2¾" Six Spindle Conomatic, with 13 HSS tools, produces the part shown here in 71 seconds.



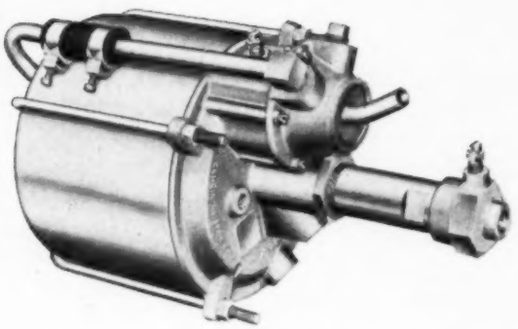
Ask your CONE representative to show you our new color motion picture

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

36

Bendix HYDROVAC 1ST IN POWER-BRAKING



precision machined on SOUTH BEND LATHES

The Bendix Hydrovac power braking unit, proved by more than a million installations and billions of miles of service, is one of many outstanding technical achievements by Bendix Aviation Corporation which played important roles with our fighting forces and are now contributing to peace-time enterprise. Hundreds of South Bend Lathes are used by Bendix Aviation Corporation in their experimental laboratories, toolrooms, and manufacturing departments for the development and production of their products.

At left: Technician Henry Janowski, Experimental Department, Bendix Products Division of Bendix Aviation Corporation, using a 16-inch swing South Bend Precision Toolroom Lathe to machine the end plate for an experimental Bendix Hydrovac.

SOUTH BEND LATHES

South Bend Precision Engine Lathes and Toolroom Lathes are made in five sizes — with 9″, 10″, 13″, 14½″, and 16″ swings. Precision Turret Lathes are made in two sizes: Series 900 with ½″ maximum collet capacity and Series 1000 with 1″ maximum collet capacity. Please state size and type of lathe when requesting catalog.

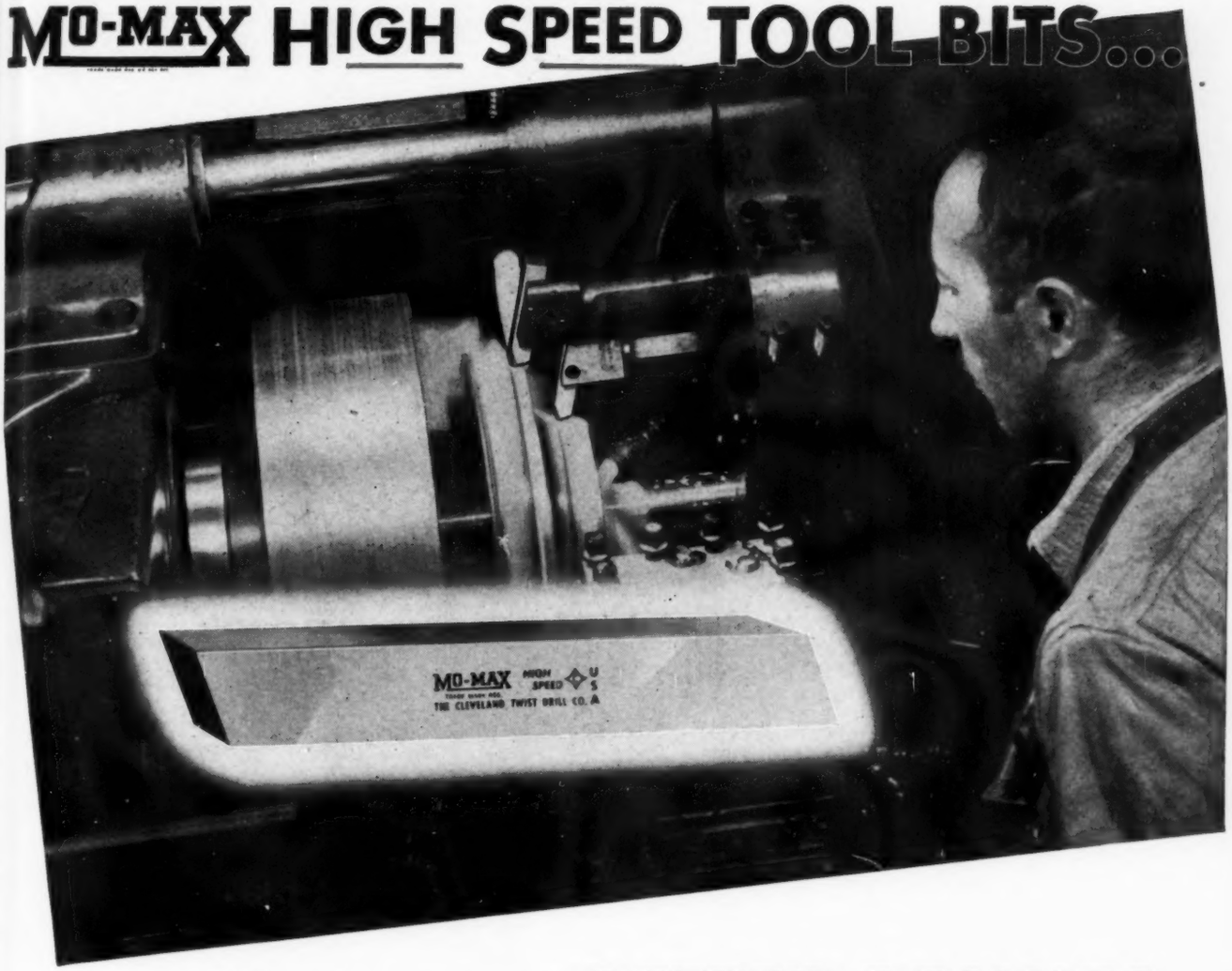
LATHE BUILDERS SINCE 1906

SOUTH BEND LATHE WORKS

419 EAST MADISON STREET
SOUTH BEND 22, INDIANA

For single or multiple cuts...

MO-MAX HIGH SPEED TOOL BITS...



...will give you BETTER RESULTS

These Ground Tool Bits, made of the famous MO-MAX High Speed Steel, have been used for many years . . . in thousands of plants . . . under all conditions. Without exception they have proved conclusively that they perform better than other high speed steels. They are finish ground on the sides after hardening. Specially packed for convenient handling, rust prevention and quick identification of sizes. MO-MAX High Speed Cut-off Blades, too, have the same superior cutting qualities. Try them both! You'll say they are the best you've ever used.

Telephone your I S D INDUSTRIAL SUPPLY DISTRIBUTOR

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49th STREET
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TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

70 THOMAS ST., NEW YORK 7 • 9 NORTH JEFFERSON ST., CHICAGO 6 • 459 HOWARD ST., SAN FRANCISCO 5
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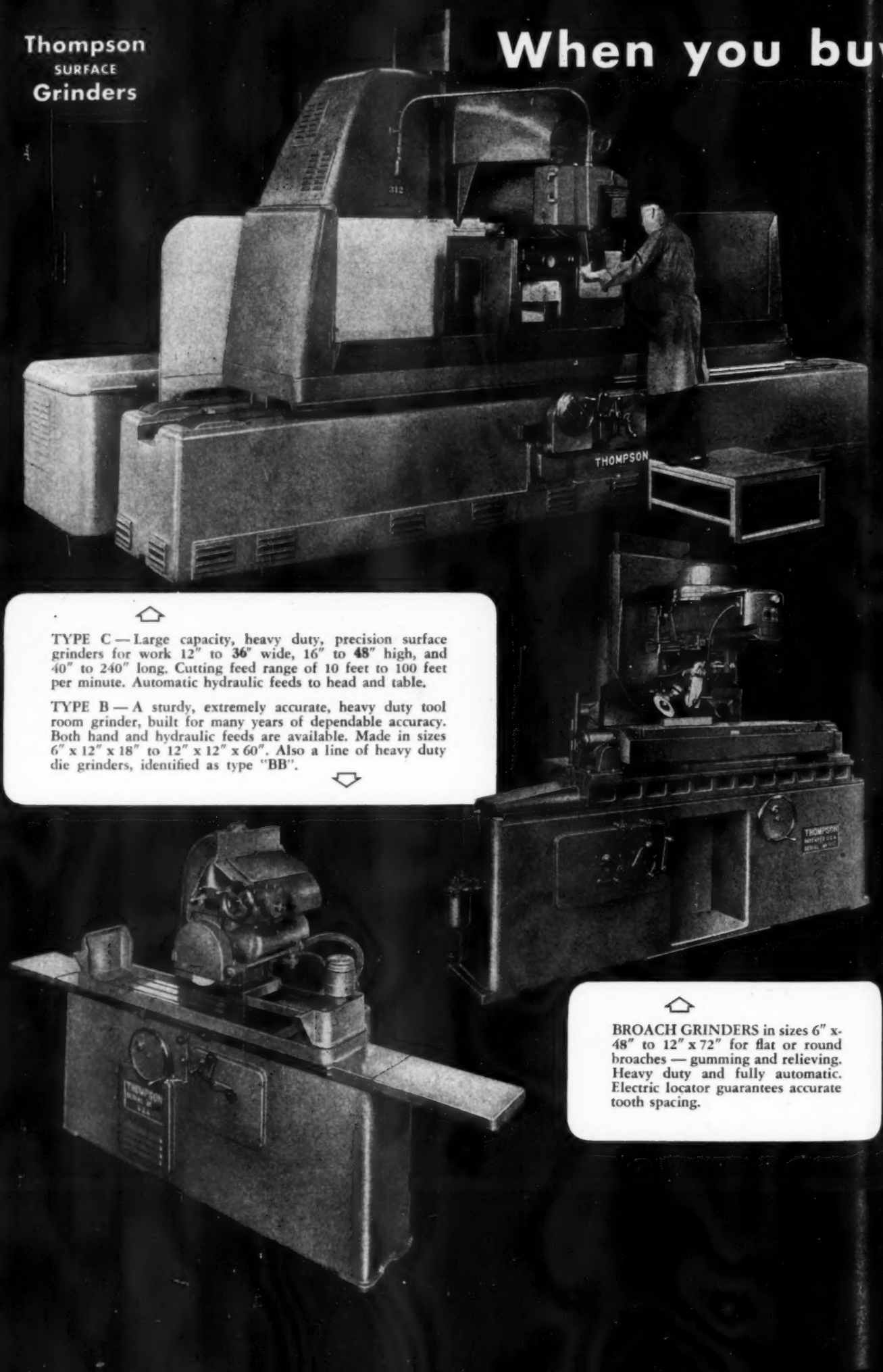
E. P. BARRUS, LTD., LONDON W. 3, ENGLAND

Thompson
SURFACE
Grinders

When you buy



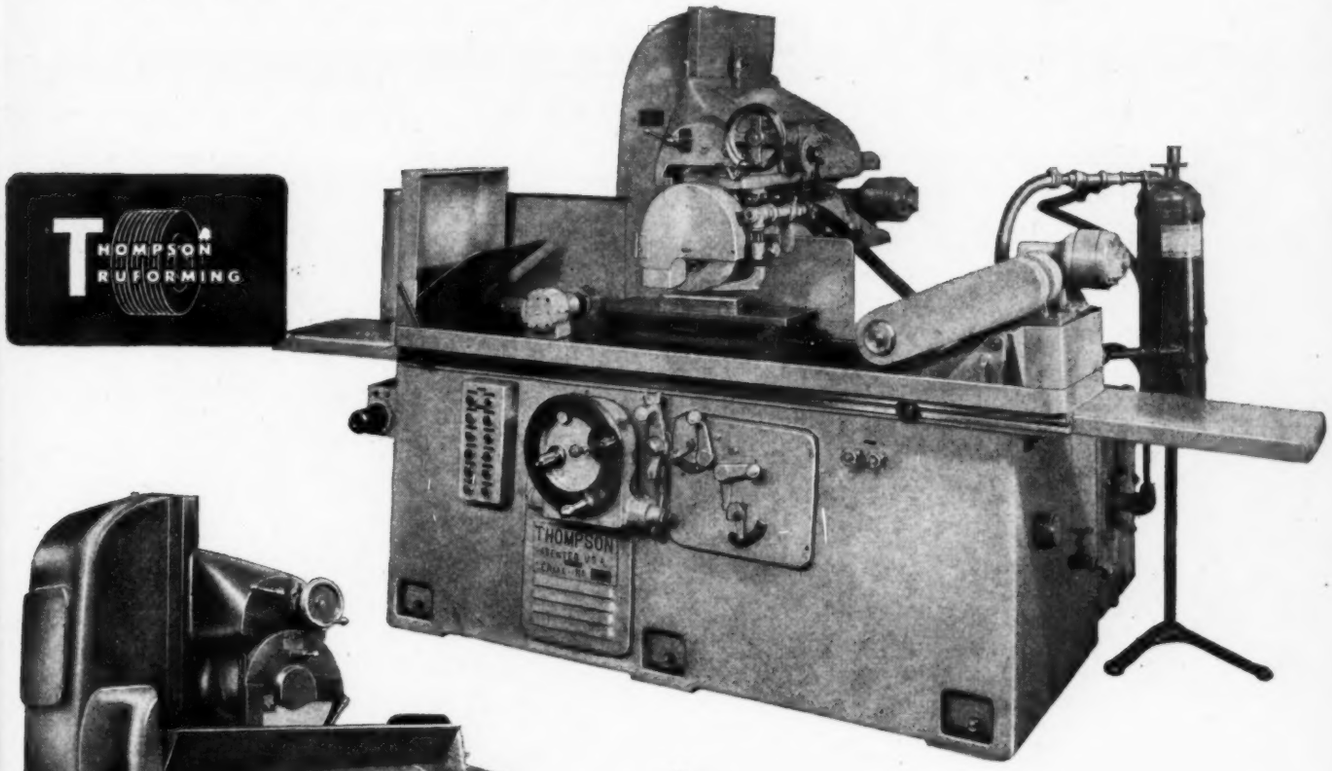
TYPE C — Large capacity, heavy duty, precision surface grinders for work 12″ to 36″ wide, 16″ to 48″ high, and 40″ to 240″ long. Cutting feed range of 10 feet to 100 feet per minute. Automatic hydraulic feeds to head and table.

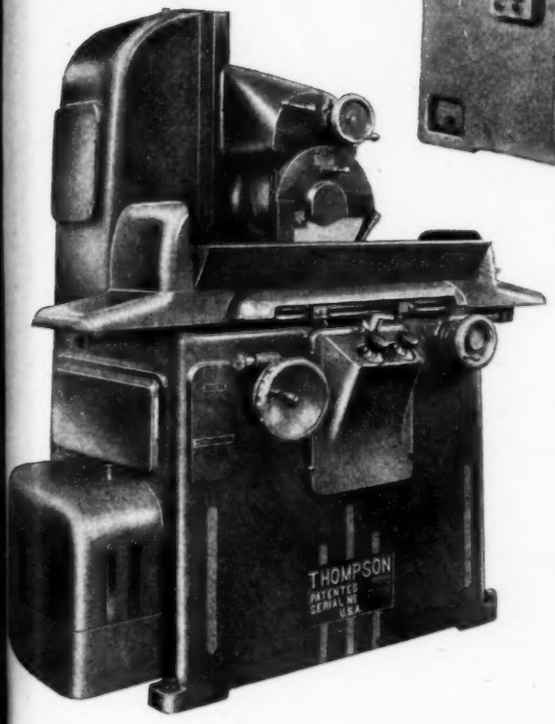
TYPE B — A sturdy, extremely accurate, heavy duty tool room grinder, built for many years of dependable accuracy. Both hand and hydraulic feeds are available. Made in sizes 6″ x 12″ x 18″ to 12″ x 12″ x 60″. Also a line of heavy duty die grinders, identified as type "BB".

BROACH GRINDERS in sizes 6″ x 48″ to 12″ x 72″ for flat or round broaches — gumming and relieving. Heavy duty and fully automatic. Electric locator guarantees accurate tooth spacing.

. get the Best Machine

There's a Thompson for Grinding every Flat Surface or Contour





TRUFORM GRINDERS (Crushed Wheel Form Grinding) — Thompson Truforming Grinders are completely engineered units with *two* crushing rolls permitting practical production of precision flat form contours for the first time. Standard machines for forms up to 6″ width available.

TYPE F — A sensitive, high speed tool room and production surface grinder. Hand and hydraulic feeds to head and table. Precision table ways; double length box bed; 6″ x 10″ x 18″.

Before You Buy

Investigate

Thompson SURFACE Grinders

Address Dept. 10

THE THOMPSON GRINDER COMPANY, INC.

SPRINGFIELD, OHIO

Copyright 1947—The Thompson Grinder Co., Inc.

One more Bearing . . .

CONVENTIONAL DESIGN

Spindles on most milling machines are supported by only 2 bearings. There is no support at the center of the shaft, where deflection is most likely to take place.

KEARNEY & TRECKER DESIGN

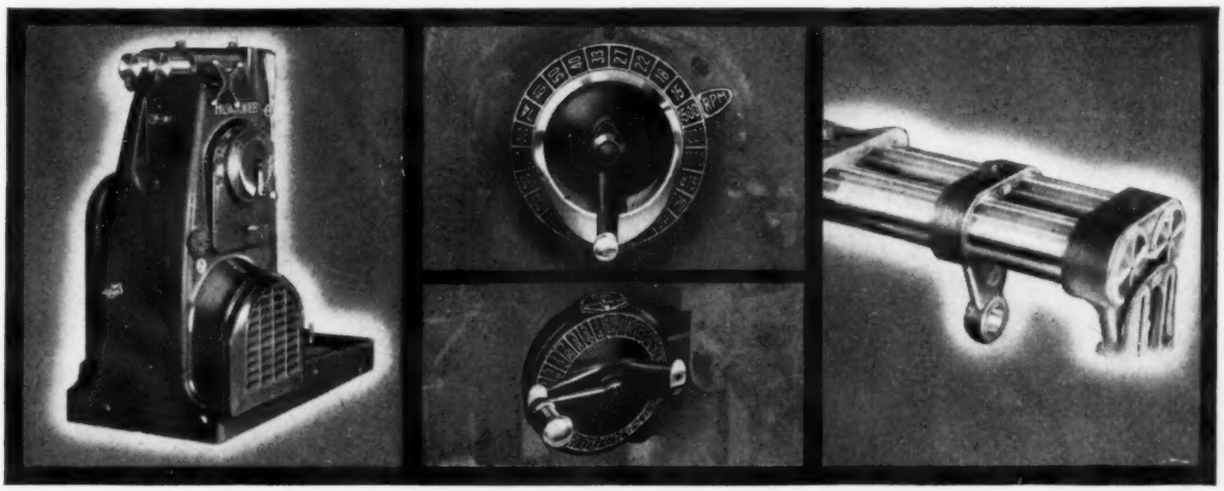
SO BASIC — SO SOUND

Because spindle deflection varies directly as the cube of the unsupported length between bearings, the additional support of the center bearing on Kearney & Trecker spindles increases rigidity 800%. That means deflection, vibration, wear are cut to minimum. Accuracy, precision, longer machine and tool life are the results — proven for years in Kearney & Trecker installations throughout the world.

KEARNEY & TRECKER
MILWAUKEE

. . 800% more rigidity!

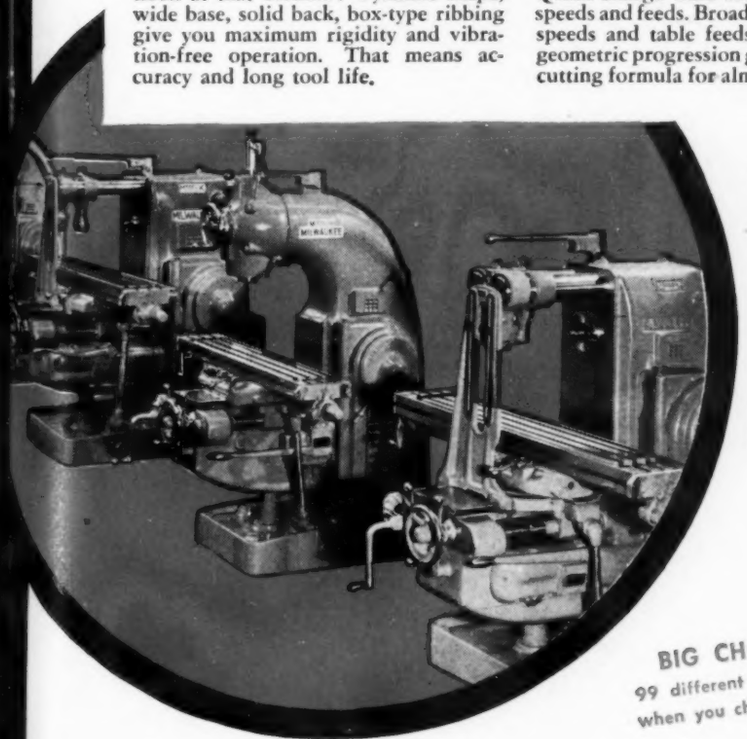
Secret of modern milling machine accuracy and longer tool life lies in three bearing spindle design . . . one of the many great features of Kearney & Trecker Milwaukee Milling Machines . . .



Look at that column! Pyramid shape, wide base, solid back, box-type ribbing give you maximum rigidity and vibration-free operation. That means accuracy and long tool life.

Quick-change dials for the selection of speeds and feeds. Broad ranges of spindle speeds and table feeds in approximate geometric progression give you the right cutting formula for almost any material.

Those double overarms provide maximum rigidity to tool set-ups — assure proper alignment and provide easy access to arbor and cutters. That means greater precision, less tool wear.



Catalog E-53 gives you complete data on our entire line — Write for it! Please indicate your business connection.

KEARNEY & TRECKER CORPORATION

MILWAUKEE 14, WISCONSIN

(476)

BIG CHOICE MEANS A BETTER BUY

99 different models, sizes and types to choose from when you choose a Kearney & Trecker — Milwaukee.

START THE NEW YEAR

Right

No. 2-20 Milling Machine
Table, 42" x 12"
Table travel, 20"

Today—it's more important than ever to keep milling costs down and production UP—by using the *right* machines! Get set now for the new jobs with modern Kent-Owens Milling Machines! They're engineered for utmost *accuracy, speed* and *dependability*... assuring steady output without costly downtime. Simple . . . practical . . . efficient . . . ruggedly built.

The Kent-Owens Standard line includes a wide range of hydraulic and hand operated machines. Let a Kent-Owens engineer recommend machines and tooling best suited to your requirements. Write today for further information. Kent-Owens Machine Co., Toledo, O.

Call on

KENT-OWENS

for Milling Machines

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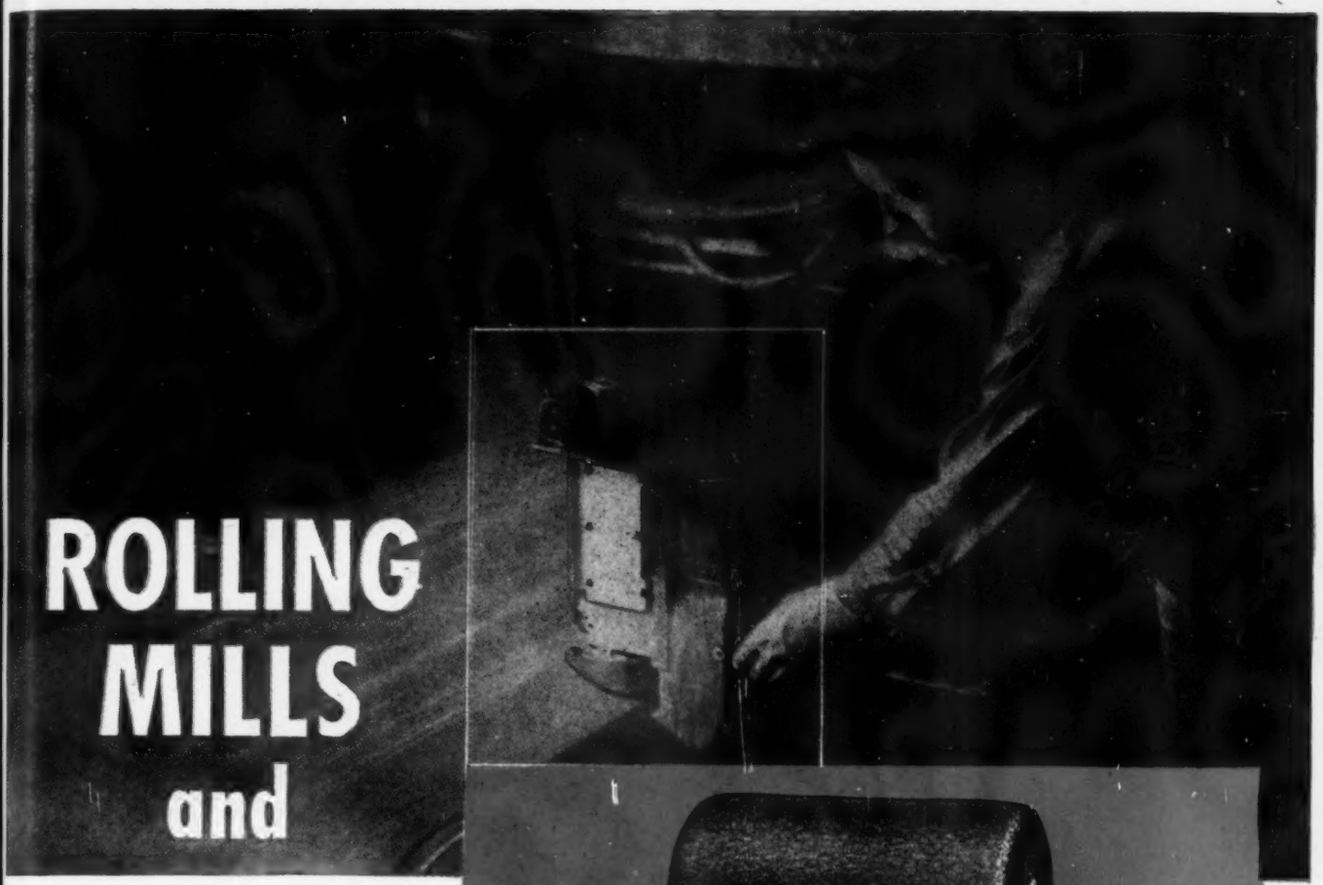
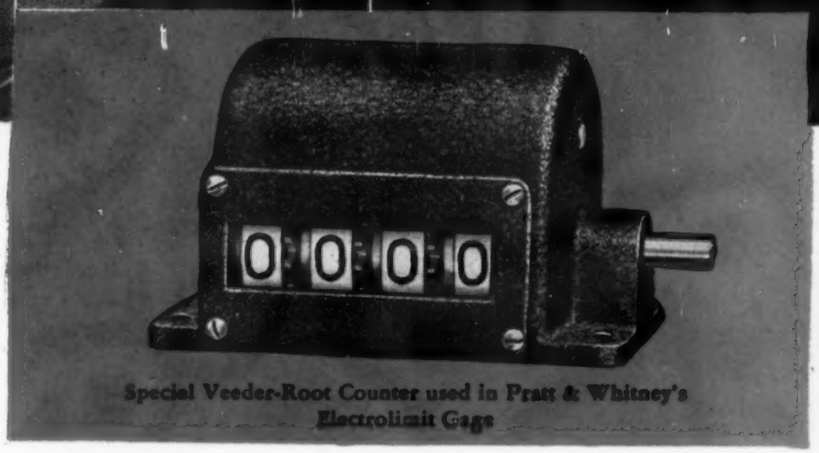


ROLLING MILLS and Hundreds of Other Products



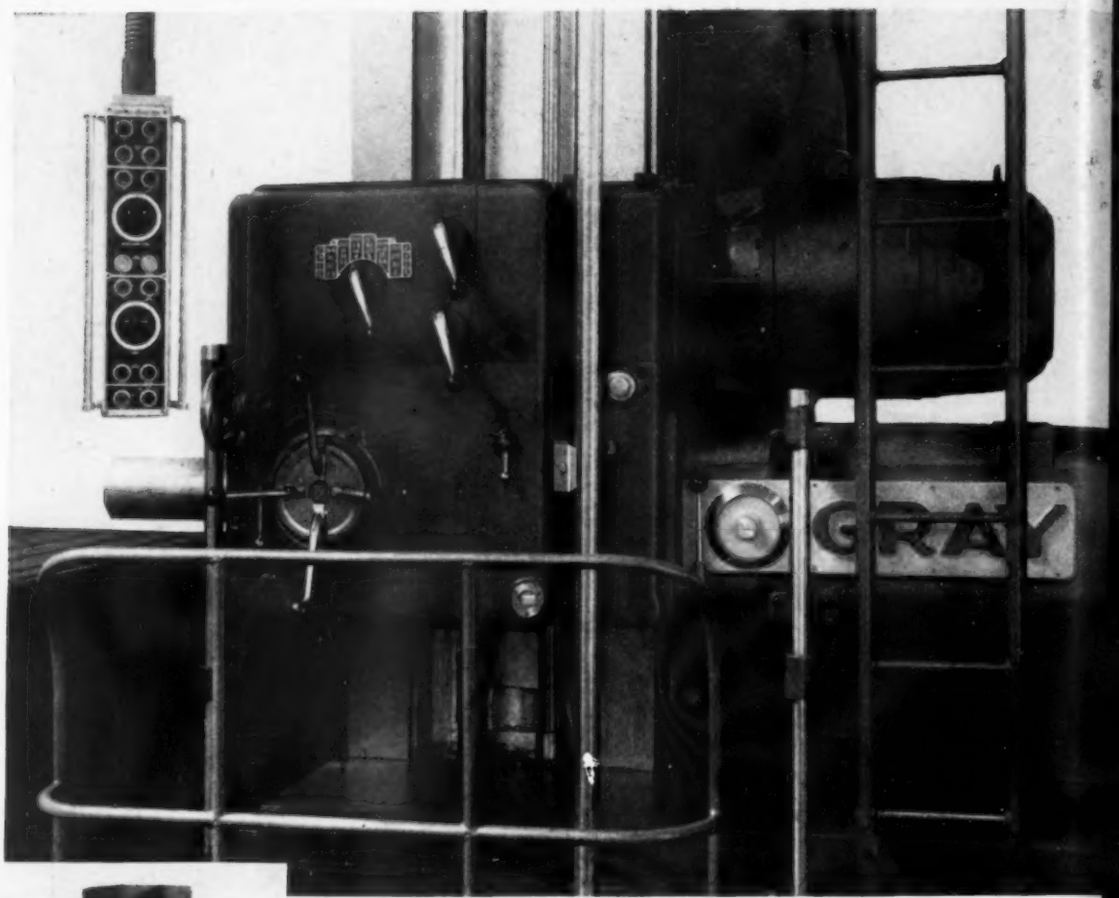
Special Veeder-Root Counter used in Pratt & Whitney's Electrolimit Gage

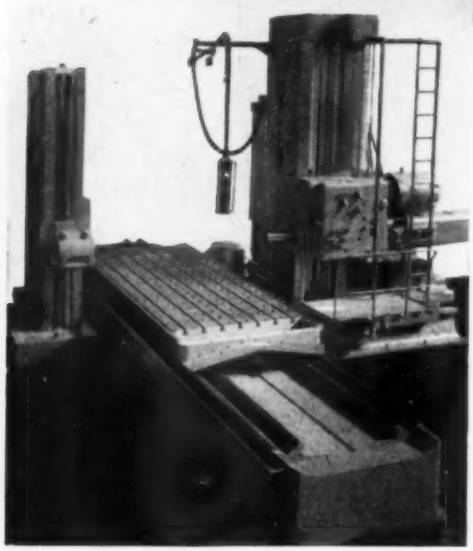
. . . all can build more profits for their makers and users by built-in VEEDER-ROOT COUNTROL

Variations in thickness of steel passing through the mill are given to the operator in a direct, decimal reading down to .0001" . . . by a Veeder-Root Counting Device mounted on the pulpit. That's *Countrol* . . . and that cuts waste, builds profit for the user of the mill . . . gives extra sales-power to the Pratt & Whitney Electrolimit Gage into which the counter is built as an integral part.

This is one of a limitless number of *special* Veeder-Root Devices developed for manufacturers of all types of products in all types of industry. Let Veeder-Root engineers show you what specialized *Countrol* can do to add new utility and sales-power to *your* product. Write to Veeder-Root Inc., Hartford 2, Conn. *In Canada:* Veeder-Root of Canada, Ltd., Montreal. *In England:* Veeder-Root Ltd. (new address on request).

Give your product this extra Merchandising Feature





Simplicity of control features new GRAY PLANER TYPE BORING, DRILLING and MILLING MACHINE

A glance at the head and pendant switch of the new GRAY PLANER TYPE HORIZONTAL BORING, DRILLING AND MILLING MACHINE will convince you of the simplicity and almost self-evident means of control. This simplicity and convenience enables the operator to turn out more work with less physical and mental strain, for he handles the machine with complete confidence and a minimum of effort.

Write for fully illustrated descriptive Bulletin No. 54

DOUBLE HOUSING and OPENSIDE PLANERS
•
SWITCH PLANERS
•
DIE BLOCK PLANERS
•
MILLING PLANERS
•
PLANER TYPE MILLING MACHINES
•
HORIZONTAL BORING MACHINES

The G.A. GRAY Co.

CINCINNATI 7, OHIO, U. S. A.

Sold in Canada by Upton, Bradeen and James Ltd. ● Sold in Latin America by Machine Affiliates.

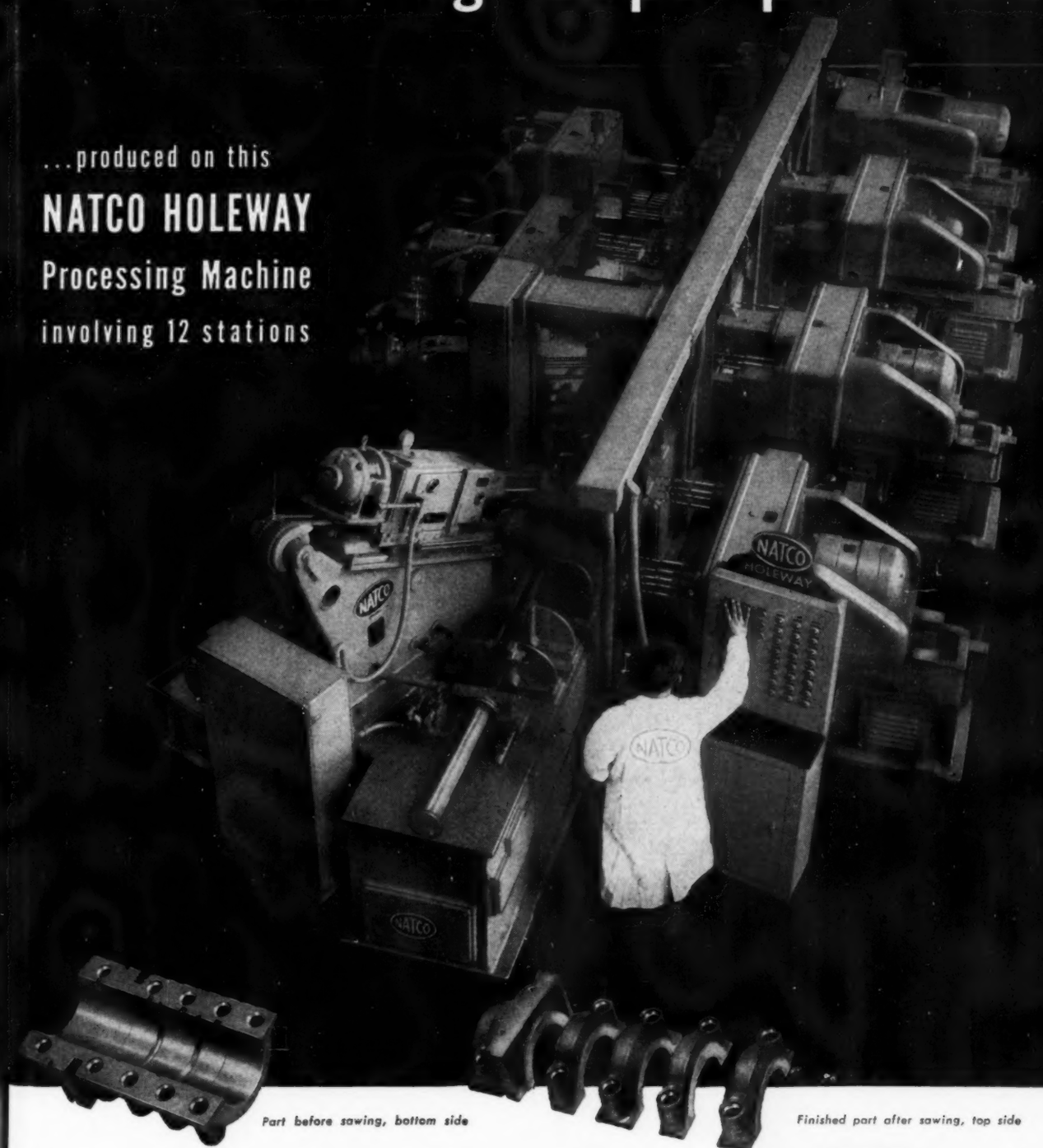
475 Bearing Caps per Hour

...produced on this

NATCO HOLEWAY

Processing Machine

involving 12 stations



Part before sawing, bottom side

Finished part after sawing, top side

One man on this NATCO HOLEWAY Processing Machine produces 95 of these bearing cap sets (475 individual bearing caps) per hour

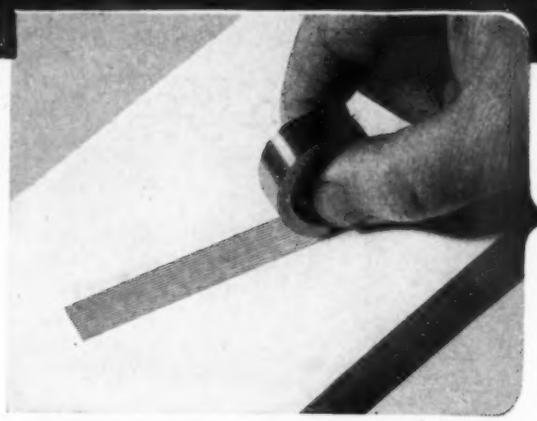
• In keeping with the trend to automatic handling — less operator fatigue and more production per man — NATCO provides this processing type machine arranged to complete the following operations between loading position # 1 and unloading position #12: drills 20 holes; mill chamfers both sides of center bearing; drills 2 angular holes; combination drills and countersinks 2 holes; chamfer 10 holes; taps two holes; countersinks 10 holes; spotfaces 10 holes; mills 5 bearing liner lock notches; saws finished bearing casting into five component parts as shown above—and unloads automatically.

NATCO

Write today for NATCO Machine Circular 145-A

NATIONAL AUTOMATIC TOOL COMPANY, INC., RICHMOND, INDIANA, U.S.A. • *Branch Offices:* **1809 Engineering Building, Chicago • 409 New Center Building, Detroit • 1807 Elmwood Avenue, Buffalo • 2902 Commerce Building, New York City**

Why Circular Chasers *Cut Costs*



1

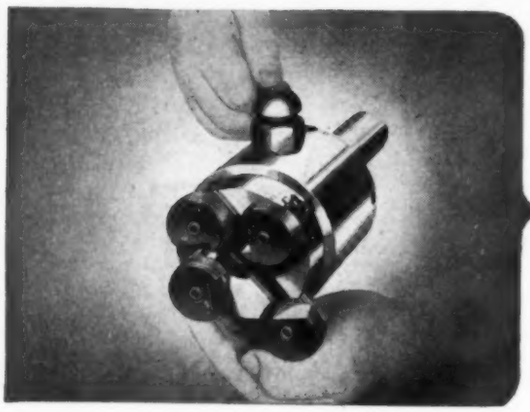
MORE CUTTING EDGE

Namco ground thread circular chasers may be reground through 270° of circumference —4 to 10 times more actual thread-cutting life than you can get with any other type of chaser.

2

PRECISION SHARPENING

Chasers, mounted on blocks, are checked for precision on the Namco Micrometer Gauge. It tells you how much to grind off, and rechecks accuracy after grinding. Eliminates all chance of variation, and speeds up the regrinding operation. Saves production time by permitting settings to be made in the toolroom.



3

FASTER REPLACEMENT

Lift handle to remove chasers—no screws to turn and no adjustments to make. You can keep a set of reground chasers ready and make the replacement in one minute, without disturbing the work. Then, the first piece turned is *production*—no cutting and trying necessary.

Catalog D-42-C gives you all details.

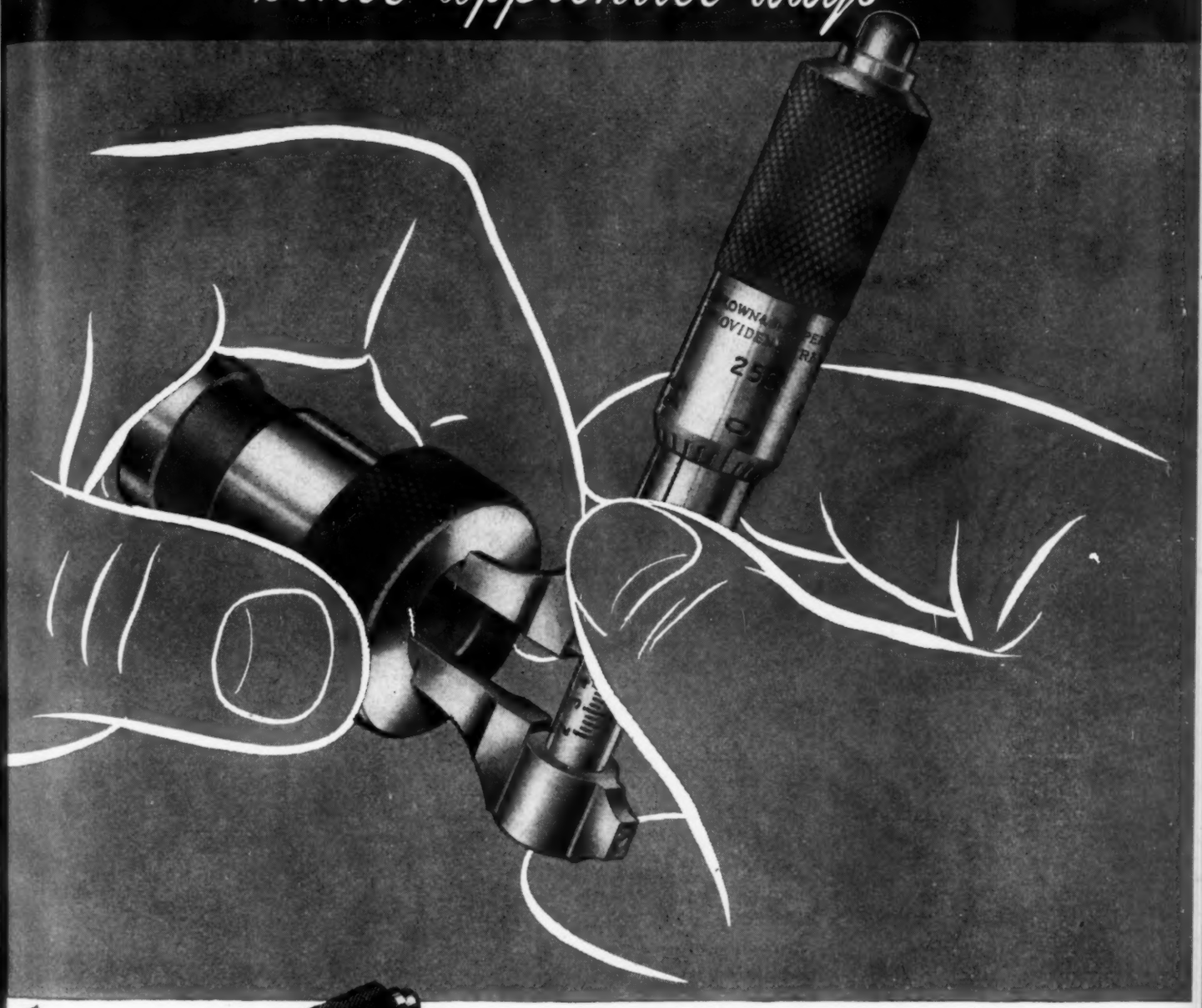
The NATIONAL ACME CO.

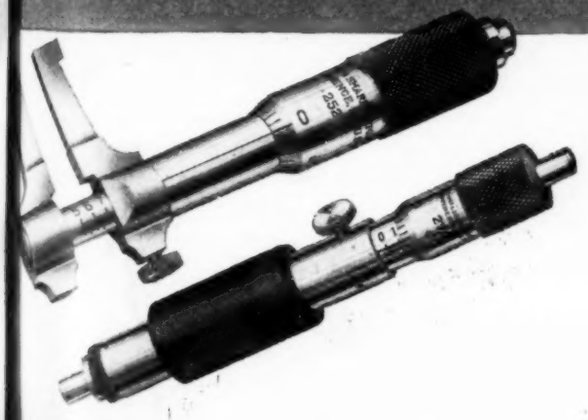
170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

PRIDE OF THE MACHINIST

since apprentice days





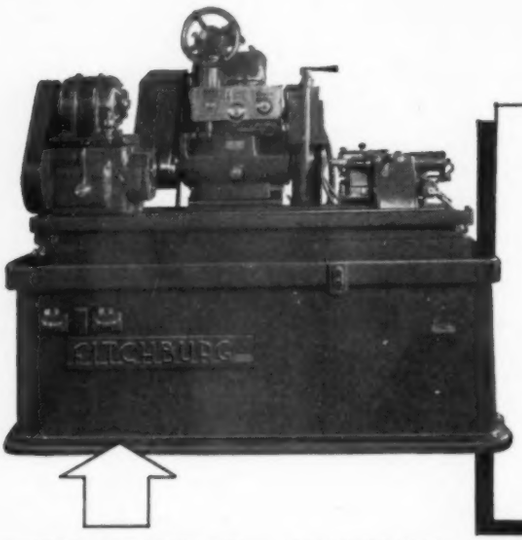
Inside Micrometers, Nos. 252 and 270, shown above, are a part of the wide line of Brown & Sharpe Machinists' Tools which include rules, combination squares, bevel protractors, straight edges, vernier tools, dial test indicators and many others.

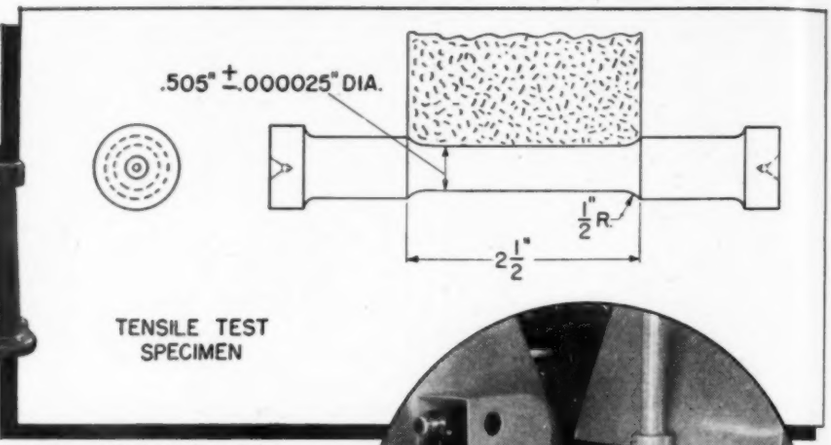
B·S

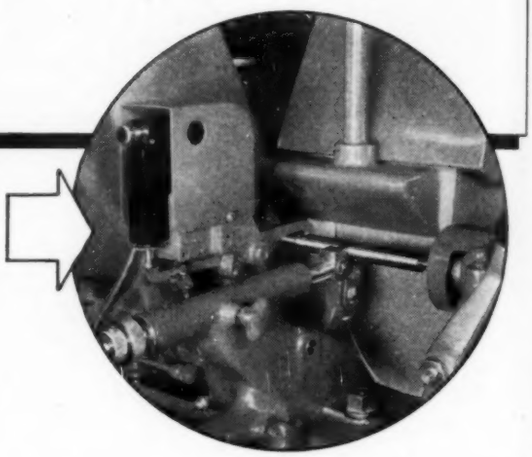
We urge buying through the Distributor

• Whether it's the machinist's own micrometer or one issued to him from the tool crib, a Brown & Sharpe tool is an old friend. That's more than familiarity. It is respect for a tradition of fine precision tool making that goes back almost to the beginning of American industry. It is the knowledge of how precisely Brown & Sharpe makes tools . . . of such details as the end-to-end accuracy of the micrometer screw, the easily read graduations and figures and the care that's taken to make accuracy last through the long life of the tool. Such tools have always been the wisest possible tool investment. Brown & Sharpe Mfg. Co., Providence 1, Rhode Island, U. S. A.

NOW the LABORATORY comes to the PRODUCTION LINE for SUPER-ACCURACY!







FITCHBURG PLUNGE-CUT GRINDER *Plus* FITCHBURG AUTOMATIC SIZE CONTROL

grinds laboratory tensile test specimens to a

TOLERANCE of ± .000025" AT THE PUSH OF A BUTTON!

HERE'S another example of how Fitchburg is bringing *automatic super-precision* cylindrical grinding out of the realm of wishful dreaming into the actual accomplishments of *today*.

This job of grinding laboratory specimens is only one of many that are performed on the machine illustrated. Changes and adjustments to take other work are easily and quickly made.

Fitchburg Automatic Size Control is the perfect complement to Fitchburg Automatic Precision Grinders. The combination is greatly increasing the man-hour productivity *and the profits* to be obtained from mass-production grinding of cylindrical parts.

At the push of one button, this Fitchburg goes through the following automatic cycle:

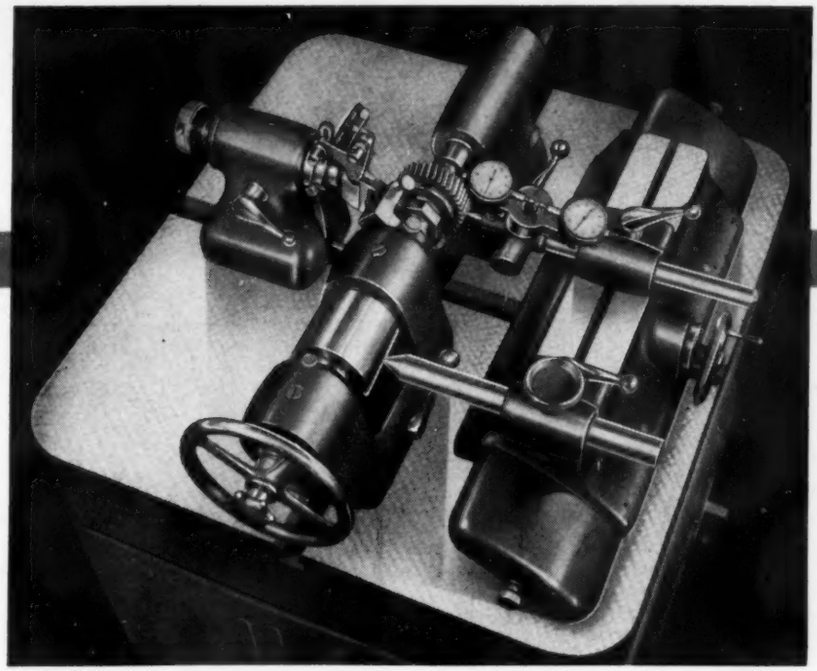
1. The work *automatically* starts revolving.
2. The wheel *automatically* traverses rapidly to the work.
3. Grinding feed diminishes as the final size is approached.
4. The Automatic Size Control takes over until the final size is reached.
5. The wheel returns rapidly to starting position.
6. The wheelhead controls *automatically* reset themselves for the next complete cycle.
7. As the wheel draws away, the work *automatically* stops rotating.

Whether it's accuracy or mass production — or accuracy *and* mass production — Fitchburg has the answer *today* to your cylindrical grinding problems of today *and tomorrow*. Drop us a line today for a quick *and profitable* solution.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of—Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.



Check GEAR TEETH for DIMENSIONAL ACCURACY

The Red Ring Universal Gear Checker is an instrument for quickly and accurately checking the dimensional errors of both spur and helical gear teeth—such errors as index, helical angle, lead, parallelism, tooth size, eccentricity, interference and wobble.

The various heads used on this instrument are so ingeniously designed that the human error in their use is practically eliminated. Consequently, the average shop man can inspect gears quickly and accurately. It doesn't require a skilled inspector.

CAPACITIES OF RED RING GEAR CHECKERS:

12″ for gears ¼″ to 12-1⅛″ O. D. • 18″ for gears 2″ to 18-⅞″ O. D.
24″ for gears 3″ to 25-½″ O. D.

Alterations can be made for special applications

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN RED RING ◯ PRODUCTS **DETROIT 13, MICH.**

SPECIALISTS ON SPUR AND HELICAL INVOLUTE GEAR PRACTICE

ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

How you can meet AGGRESSIVE COMPETITION

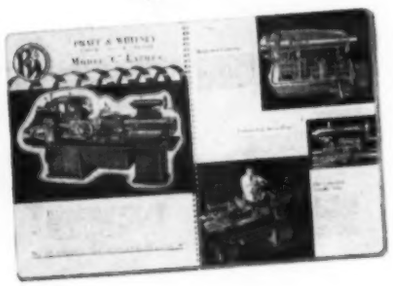
This Keller Machine is the fast, modern way to cut molds, dies and a multitude of complicated shapes.

By throwing out OBSOLETE EQUIPMENT

In the coming struggle for survival only the shop that can produce quality at lowest cost will pay off. Only the shop that has fast, efficient and accurate equipment will be able to meet present day labor and material costs and have a margin left over.

Smart management men are finding the answer in new, efficient Pratt & Whitney equipment — an answer that assures top quality and precision to meet the specifications of demanding engineers — lower price for buyers with a sharp pencil — faster delivery for customers who cannot wait.

As a result, scores of shops, from ten-man size up to the largest, are replacing obsolete equipment with P&W jig borers, Keller machines, lathes and other machines that pass on their accuracy to the work they turn out.



Investigate the entire line of Pratt & Whitney precision products. Ask on your letterhead for a copy of our Condensed Catalogue.

Pratt & Whitney

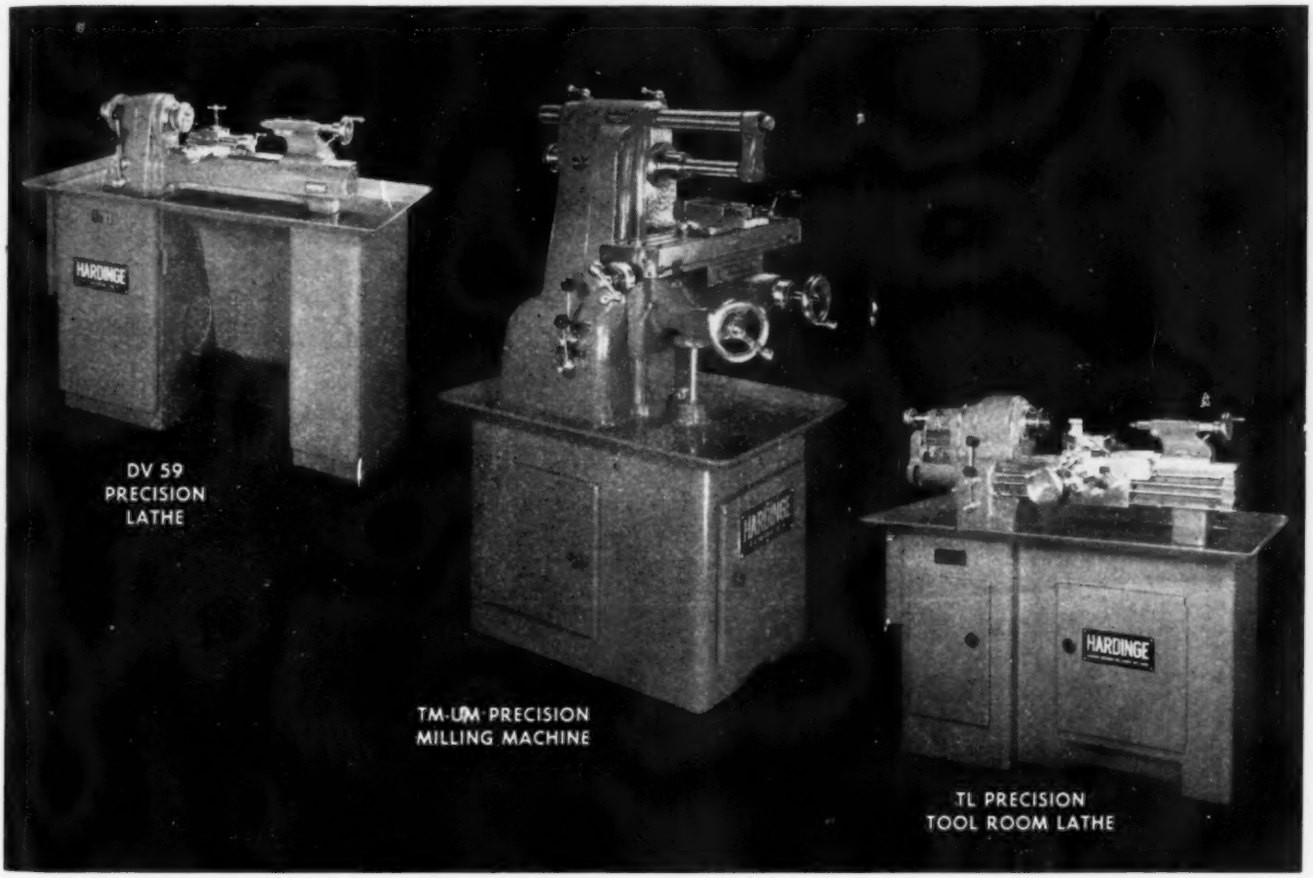
Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT

HARDINGE
ELMIRA, N.Y.

MATCHED FOR PRECISION TOOL ROOM WORK

HARDINGE High Speed Precision Lathe
HARDINGE High Speed Precision Milling Machine
HARDINGE High Speed Precision Tool Room Lathe



Here are three machines that are specifically matched together to step up precision production in your tool room, laboratory and development departments—the HARDINGE High Speed Precision DV 59 Lathe, the HARDINGE High Speed Precision TM-UM Milling Machine, and the HARDINGE High Speed Precision TL Tool Room Lathe.

Now you can handle, with facility, the greater portion of your tool room type work with lower costs than when done on large, slow machines. Interchangeability of attachments among these Hardinge matched machines permits handling a variety of work with minimum expense. For example, all spindles take standard 5C HARDINGE 1″ capacity collets, including the spiral or plain index centers for the milling machine.

Write for illustrated bulletins which give complete details.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.
"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

An example of mass grinding at a greater profit.

Six ensilage knives are held on a 36" magnetic chuck of a No. 18 Blanchard Surface Grinder. The materials, combining mild and tool steel, make this one of the most difficult of grinding jobs. Size of the piece, and tolerance are as shown in the sketch.

Average stock removal is .020" each side. Both sides of the knife are Blanchard ground.

Production is 24 pieces (48 surfaces) per 50-minute hour. This includes loading and unloading time.

FOR FLAT SURFACE GRINDING AT ITS HIGHEST EFFICIENCY

More than 30 years of concentration on the most efficient solution of flat surface grinding problems is our greatest asset—and one which we'll gladly share with you, without obligation on your part.

You may be sure that the recommendations that we make will be the most profitable solution of your metal removal problems . . . that our production data are reliable . . . that any Blanchards that you may buy will do everything that we say they will.

A Blanchard service that you may not know about is "SAMPLE GRINDING." Full details of this service are given on Page 77 of the Blanchard book illustrated below. Ask for your free copy.

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

because they can be depended on for ECONOMY, EFFICIENCY *and* SPEED

All the essential performance qualities demanded in small tools today are met in UNION TOOLS.

Faster cutting, longer life between grinds, accuracy and all-round better performance of these tools are matters of common recognition in plants busy on work where small tools are subjected to the most exacting service conditions.

You, too, can depend on UNION TOOLS for your requirements. Try them once and you'll use them regularly.

THE UNION LINE

Twist Drills — Milling Cutters — Reamers — Hobs — Slitting Saws — End Mills — Taps — Dies — Screw Plates — Profile Cutters.

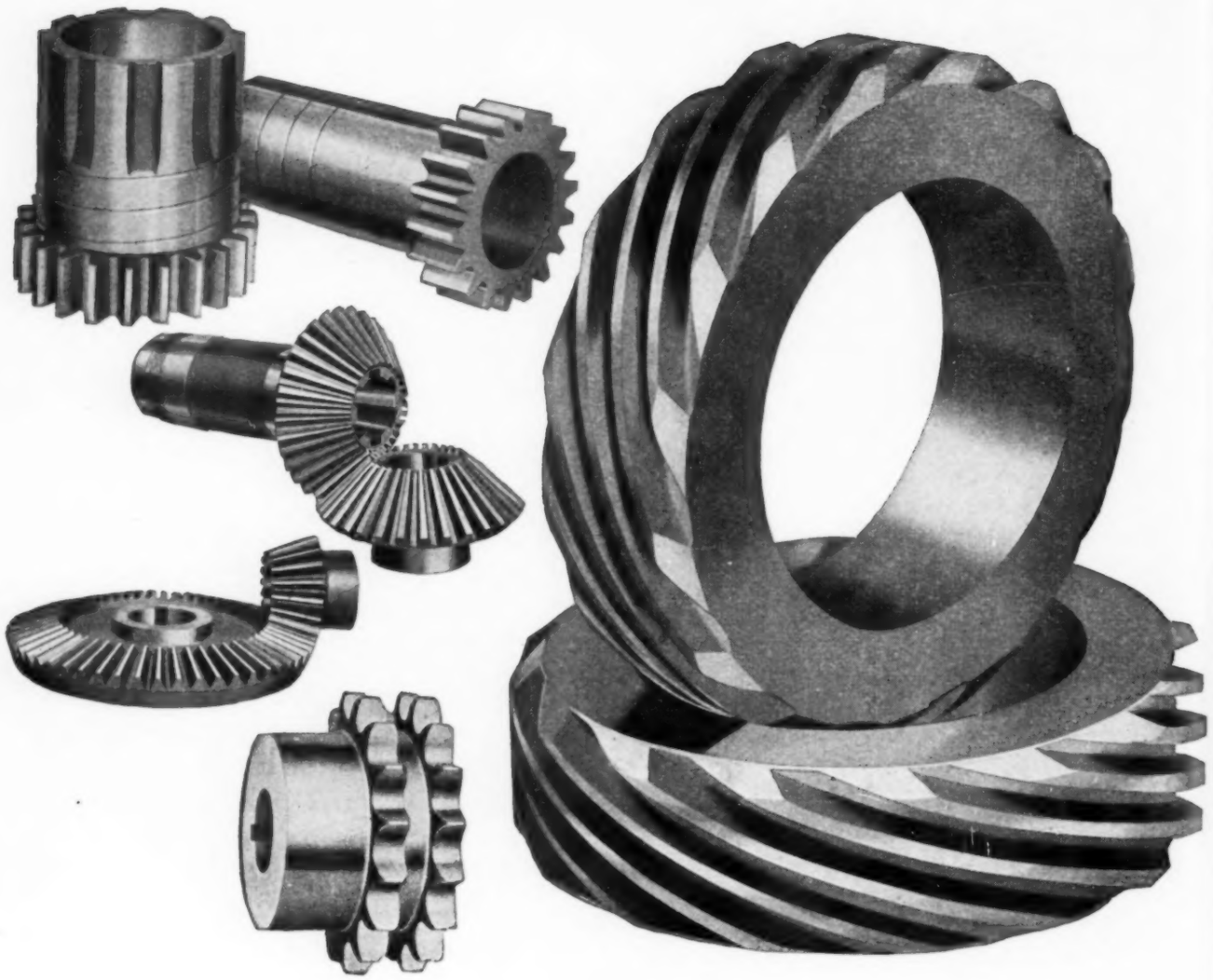
UNION TWIST DRILL COMPANY, ATHOL, MASS.

STORES—New York: 61 Reade St., Chicago: 11 So. Clinton St., Detroit: 5527 Woodward Ave., San Francisco: 121 Second St., Los Angeles: 524 E. Fourth St., Seattle: 568 First Ave., South.

MANUFACTURING DIVISIONS

S. W. Card Mfg. Co. Div., Mansfield, Mass.
Butterfield Div., Derby Line, Vt.
Butterfield Div., Rock Island, Quebec.

UNION



GEARS

We are specialists in the production of GEARS for individual needs. You are assured of uniformity and accuracy regardless of the quantities or the gear types you need. We meet your specifications in full.

Get the benefit of our long experience for your next gear needs. Our engineering service is available for consultation.

The **ADAMS** COMPANY
DUBUQUE, IOWA
ESTABLISHED 1883

Fosdick FLEXIBILITY SAVES TIME AND COSTS ON RADIAL OPERATIONS

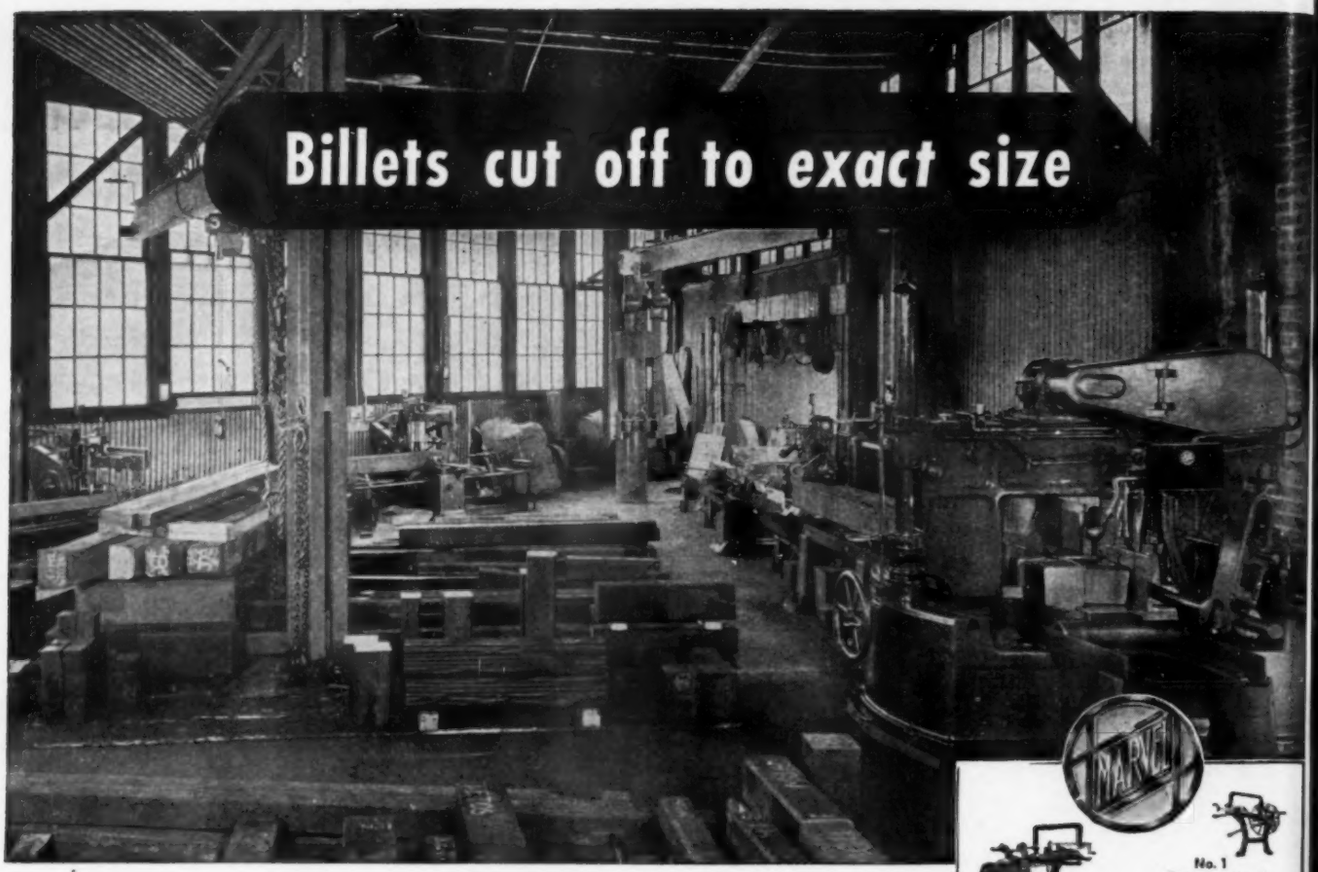
● The full hydraulic control simplifies the mechanical mechanism and provides ease of movement. Variable rapid traverse to the head—hydraulic column clamp—all controls at operators' fingertips—thirty-six spindle speeds and eighteen feeds are a few of the many features that make for ease of operation and adaptability to a wide range of work.

For example, on the work shown, a series of large holes are being drilled in a flange. A template is used to enable operator to quickly locate hole positions.

On your radial work specify Fosdick for speed—accuracy—economy.

Full descriptive Radial Drill Bulletin available. Write for Radial Bulletin R.D.A. The Fosdick Machine Tool Company, Cincinnati 23, Ohio

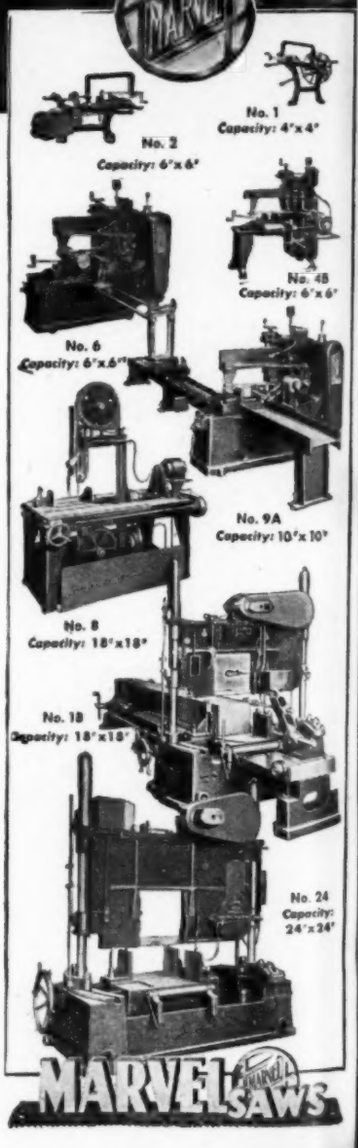
THE Fosdick MACHINE TOOL COMPANY
CINCINNATI 23, OHIO



ANY QUANTITY CUT-OFF AUTOMATICALLY

These MARVEL Saws are money makers for this modern forge shop in many ways. (1st) they cut off billets for a small fraction of the cost of cutting-off with a hammer. (2nd) these billets are so accurate in size that they exactly fill the dies with no excess fin, not only simplifying trimming and finishing, but getting extra billets from many bars. (3rd) they keep all hammers busy on *production* work for these "world's fastest" saws can keep ahead of any schedule. (4th) they reduce cutting-off labor costs to an absolute minimum. It takes only one operator and a helper to keep all of these saws running because all but the No. 18 Giant Hydraulic Saw (at the right) are *automatic* —feed measure, and cut-off identical billets; requiring no more attention than automatic screw machines.

Your local MARVEL Sawing Engineer will gladly call and explain how you can add these five extra profits to your forge operation.



ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 BLOOMINGDALE AVENUE **CHICAGO 39, U.S.A.**

Eastern Sales Office: 225 LAFAYETTE ST., NEW YORK 12, N. Y.

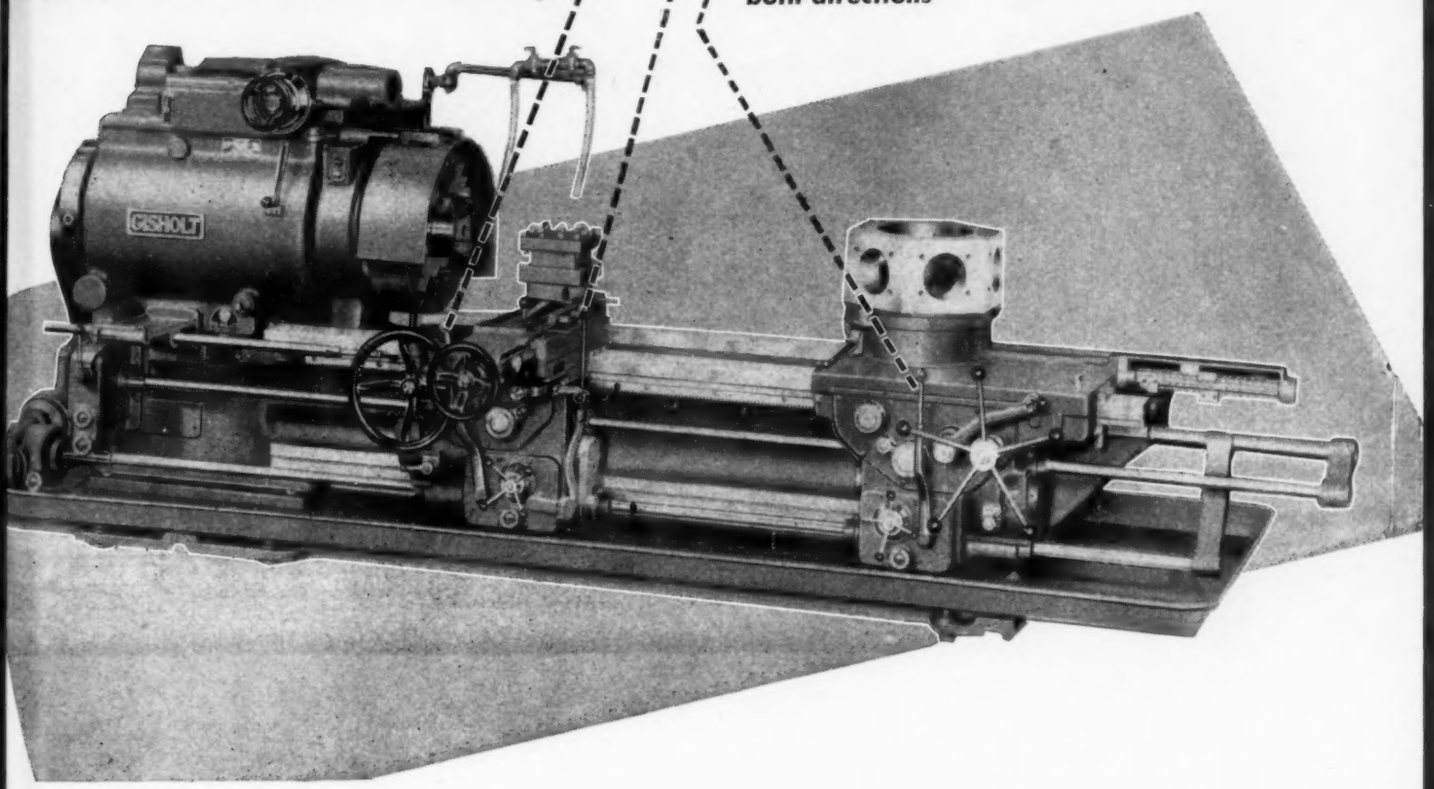
MARVEL SAWS

6-WAY power rapid traverse

For movement of square turret carriage back and forth along the bed

For movement of cross slide in and out

For movement of hexagon turret carriage in both directions

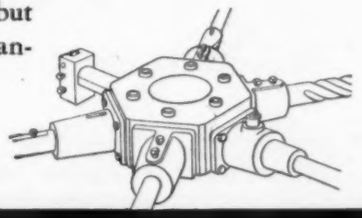


GISHOLT High Production Saddle Type Turret Lathes

Whatever the movement on approach or retraction of tools—on both square and hexagon turrets—Gisholts provide power rapid traverse that saves time and effort.

Power is transmitted from an independent motor through worm reduction to each apron, insuring smooth and easy control of heavily loaded turrets by convenient traverse levers. Feeds are automatically disengaged when traverses are used.

Power rapid traverse, as perfected for every movement of both carriages, is but one of many important Gisholt advantages that reduce time and costs on a variety of turning work. Learn about all the advanced features on Gisholt Turret Lathes. Write for literature.



GISHOLT MACHINE COMPANY

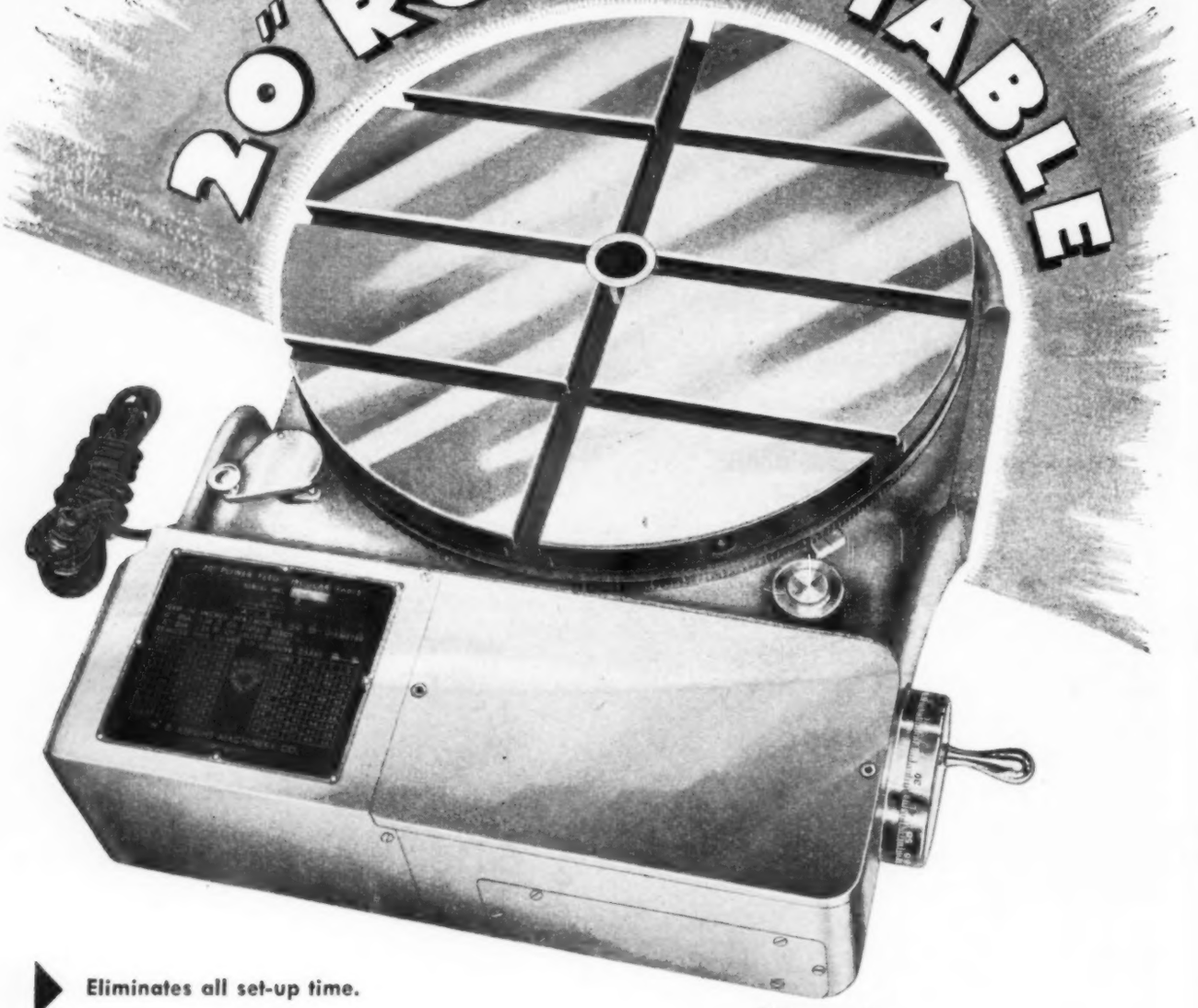
1245 East Washington Avenue • Madison 3, Wisconsin

Look Ahead . . . Keep Ahead . . . with Gisholt

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

NEW *Single-Unit Motor-Driven* 20" ROTARY TABLE



- Eliminates all set-up time.
- May be used on any make of milling machine or horizontal boring mill.
- Plug it into the nearest light socket and it's ready to go.

Write for Complete Information

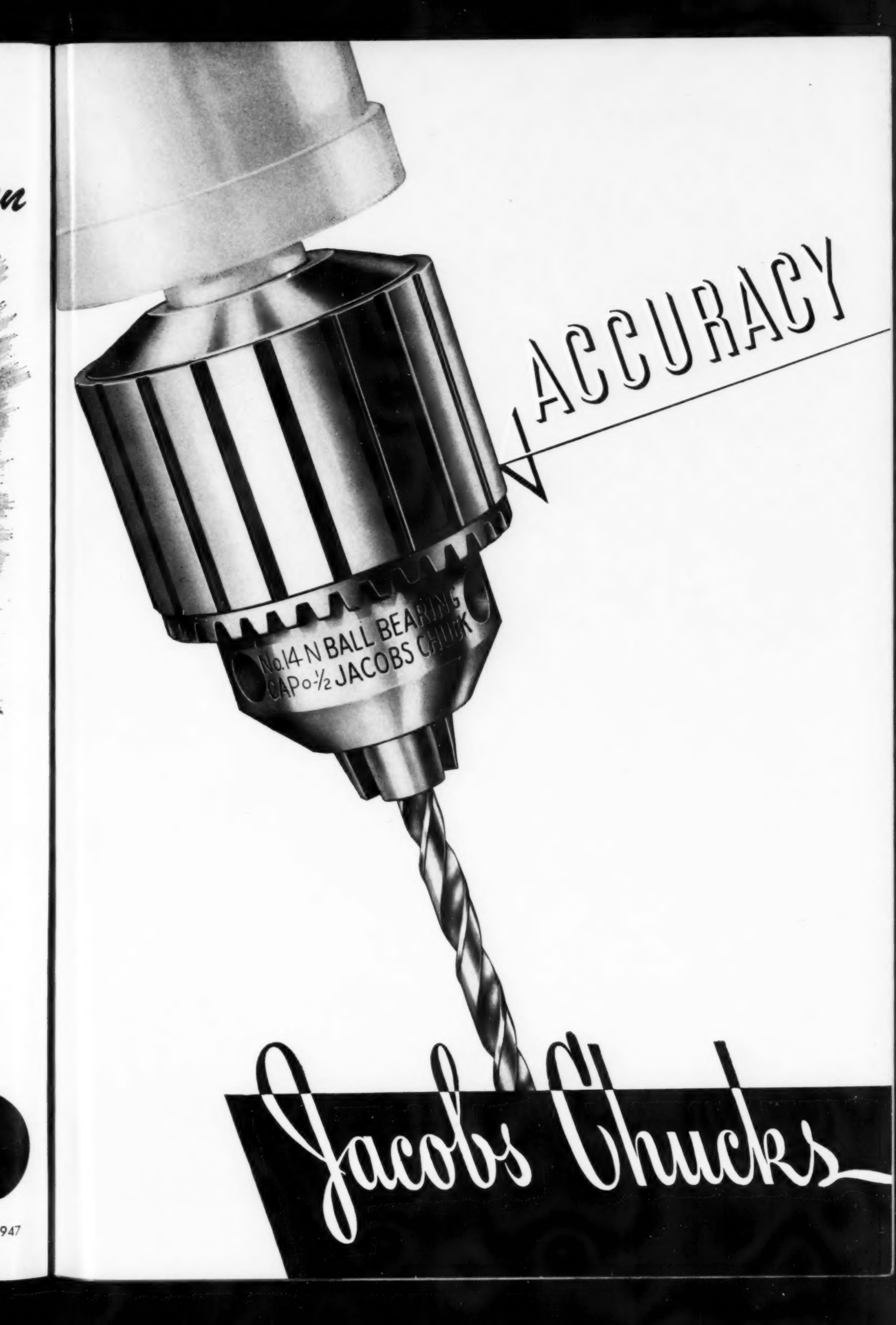
W.B.KNIGHT

MACHINERY COMPANY

KNIGHT VERSATILE MILLERS ACCURATE-RIGID

MORE GOODS for MORE PEOPLE at LOWER COST

3920 WEST PINE BLVD. • ST. LOUIS 8, MISSOURI


ACCURACY
No.14 N BALL BEARING
CAP o-½ JACOBS CHUCK
Jacobs Chucks

HOW JACOBS OBTAINS & MAINTAINS ACCURACY

ENGINEERING DETAIL Progressive scale product drawings showing dimensions and tolerances for *each* operation on *each* part are used. There are 3500 active production drawings.

STRICT INSPECTION CONTROL Maintained by an inspection staff independent of manufacturing supervision, employing highly specialized gauging methods. Process inspection for each operation – 100% final inspection.

SPECIALIZED MACHINES Special automatic and semi-automatic machines developed and built by Jacobs as the result of forty-five years of specializing in one product – universal type drill chucks.

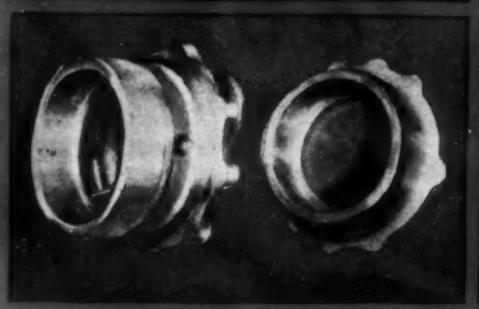
MANUFACTURING METHODS With a time-proven design manufacturing methods have been gradually perfected from the experience gained in producing more drill chucks than any other company in the world.

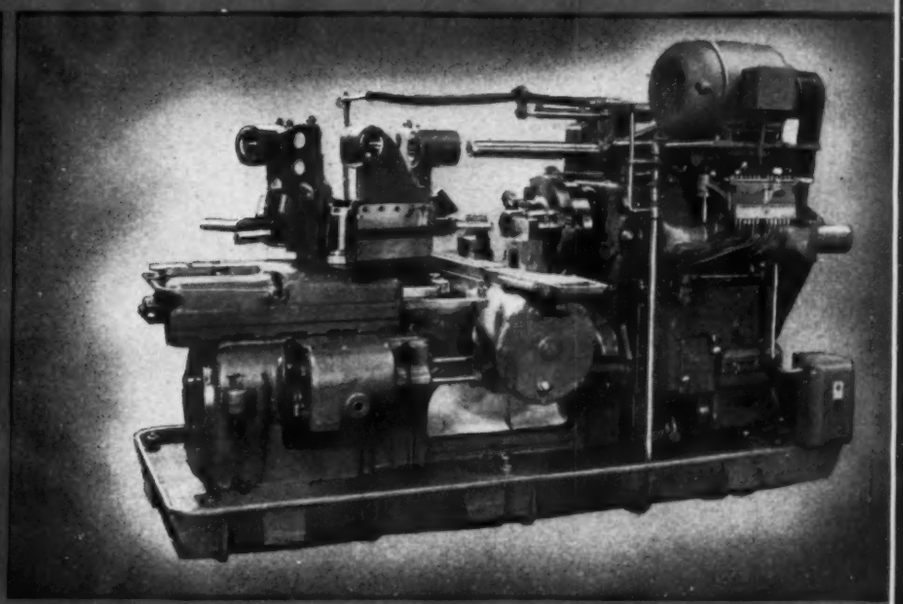
"IF IT'S A JACOBS, IT HOLDS"

The Jacobs Manufacturing Company, Hartford 2, Connecticut, U.S.A.

Special Tooling on a... P & J 5-D AUTOMATIC -

takes care of all 10 operations....on 3 different parts





THIS tooling is an outstanding example of what can be accomplished on the 5 D Single Spindle P & J Automatic.

The parts machined are of malleable iron for automotive application. Machining time is low and the number of pieces per hour remarkably high. Full details of production time are available on request.

In addition to the single spindle machine which is the subject of this case study, Potter & Johnston also builds three sizes of two spindle models which can handle any of the work now being performed on single spindle automatics if lot size and production requirements justify the double set up.

It will be to your advantage to consult P & J engineers on any problem pertaining to duplicate parts production.

DETAILS OF JOBS

BEARING CAP—1 OPERATION

Procedure: Presenting closed end to spindle, grip on 1-11/16 rod. with 3 chuck jaws.

Machine as follows:

1st T.F.—Rough bore 5.3437" dia., face bottom of same; rough turn 6.436s" dia. face flange.

2nd T.F.—Blank

3rd T.F.—Finish the above; break corners.

4th T.F.—Size bore 5.3437" dia.; size turn 6.4365" dia.

BEARING CAGE—2 OPERATIONS

1ST SETTING

Procedure: Grip on hub dia, with 3 chuck jaws.

Machine as follows:

1st T.F.—Rough bore 4.998" dia. face bottom; rough face both sides of flange.

2nd T.F.—Finish face bottom; machine undercut (Slide Tool)

3rd T.F.—Finish bore and chamfer 4.998" dia.; finish face both sides of flange; under cut body rear of flange.

4th T.F.—Size bore 4.998" dia. Allow sufficient space for grinding.

2ND SETTING

Procedure: Presenting finished end to spindle, locate on plug in bore and hold back with 3 fingers or clamps over flange.

Machine as follows:

1st T.F.—Rough bore and face 4.998" dia., rough turn and face 5.873" dia.

2nd T.F.—Finish face and undercut bottom (Slide Tool)

3rd T.F.—Finish bore and chamfer 4.998" dia.; finish turn, face and chamfer 5.873" dia.

4th T.F.—Size bore 4.998" dia. Size turn 5.873" dia. Allow for grinding where necessary.

BEARING CAGE—2 OPERATIONS

1ST SETTING

Same as for 1st Setting (2).
Allow for grinding where necessary.

2ND SETTING

Same as for 2nd Setting (3).

PINION CARRIER—2 OPERATIONS

1ST SETTING

Procedure: Presenting small end to spindle, grip on flange with 3 chuck jaws.

Machine as follows:

1st T.F.—Bore and face 5.373" dia., face flange; turn and face 6.2500" dia.

2nd T.F.—Machine undercut in bore (Slide Tool).

3rd T.F.—Finish bore 5.373" dia. Size turn 6.2500" dia. Chamfer both sides of hub face end and flange.

4th T.F.—Size bore and turn.

2ND SETTING

Procedure: Presenting finished end to spindle, place in fixture, locating on plug in bore and hold back with 3 fingers or clamps over flange.

Machine as follows:

1st T.F.—Bore and face 4.748" dia.; bore 4-13/16" dia. rough face end.

2nd T.F.—Machine undercut in bore (Slide Tool).

3rd T.F.—Finish as roughed on 1st T.F.; break corners.

4th T.F.—Size bore 4.748" dia.

PINION CARRIER—2 OPERATIONS

1ST SETTING

Same as for 1st Setting (6).

2ND SETTING

Same as for 2nd Setting (7).

BEARING CAP—1 OPERATION

Procedure: Presenting flange end to spindle, grip on same with 3 chuck jaws.

Machine as follows:

1st T.F.—Rough face flange; rough turn 6-23/32"-6.748" dia. rough face end; bore and face 5.874" dia.

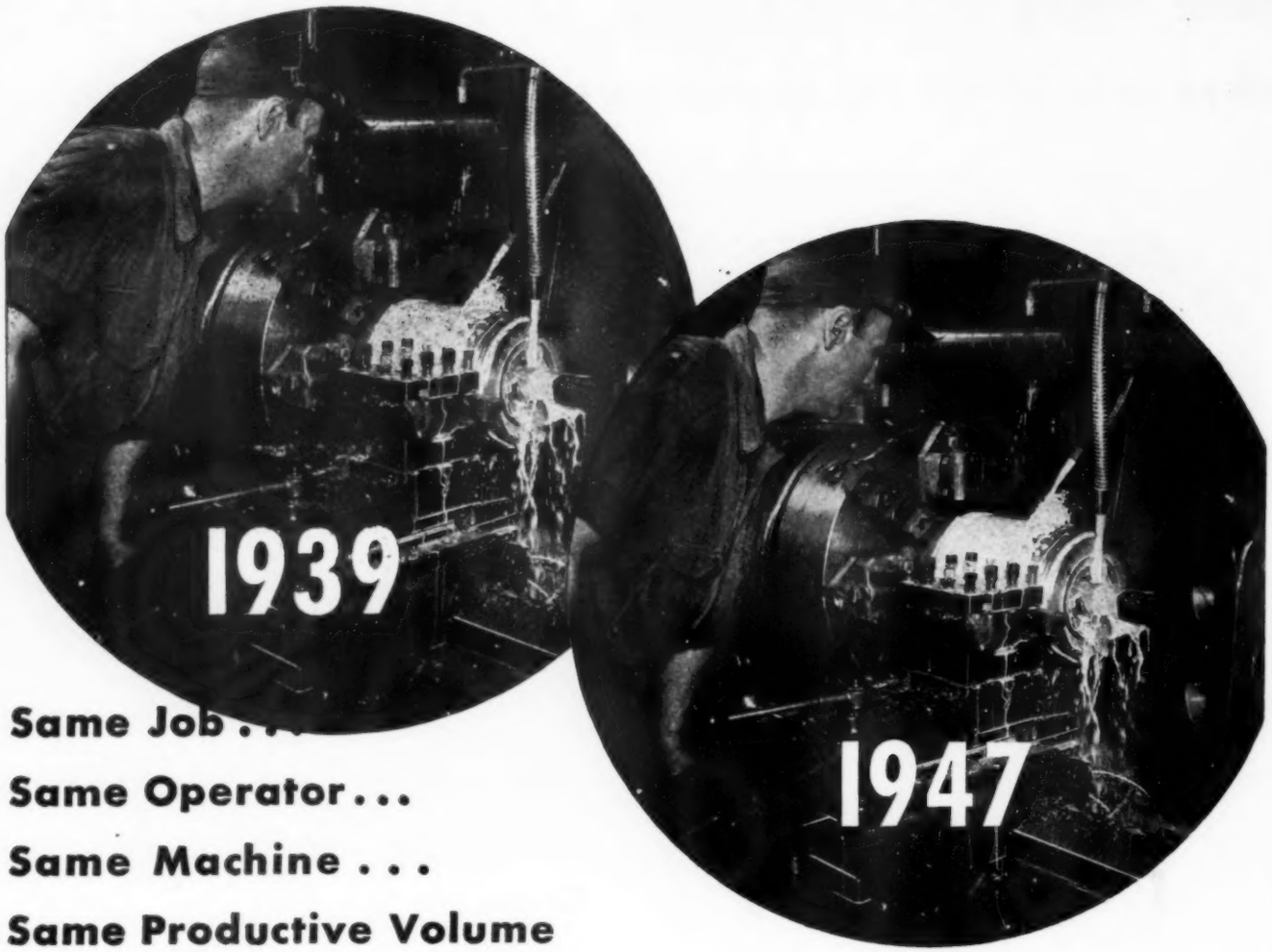
2nd T.F.—Blank

3rd T.F.—Finish the above; break corners.

4th T.F.—Size bore 5.874" dia.; size turn 6.748" dia.

POTTER & JOHNSTON MACHINE CO.

Pawtucket, Rhode Island



Same Job . . .

Same Operator . . .

Same Machine . . .

Same Productive Volume

but

UNIT COST UP 35%

● Thousands of shops face this picture. After reconversion, they are again producing the same parts in the same volume as in the best prewar year. Operators' skill and machine productivity may be fully up to 1939 records.

But accurate surveys of over 2500 metal working plants disclose that today's cost of materials, overhead, and labor are 35% above 1939.

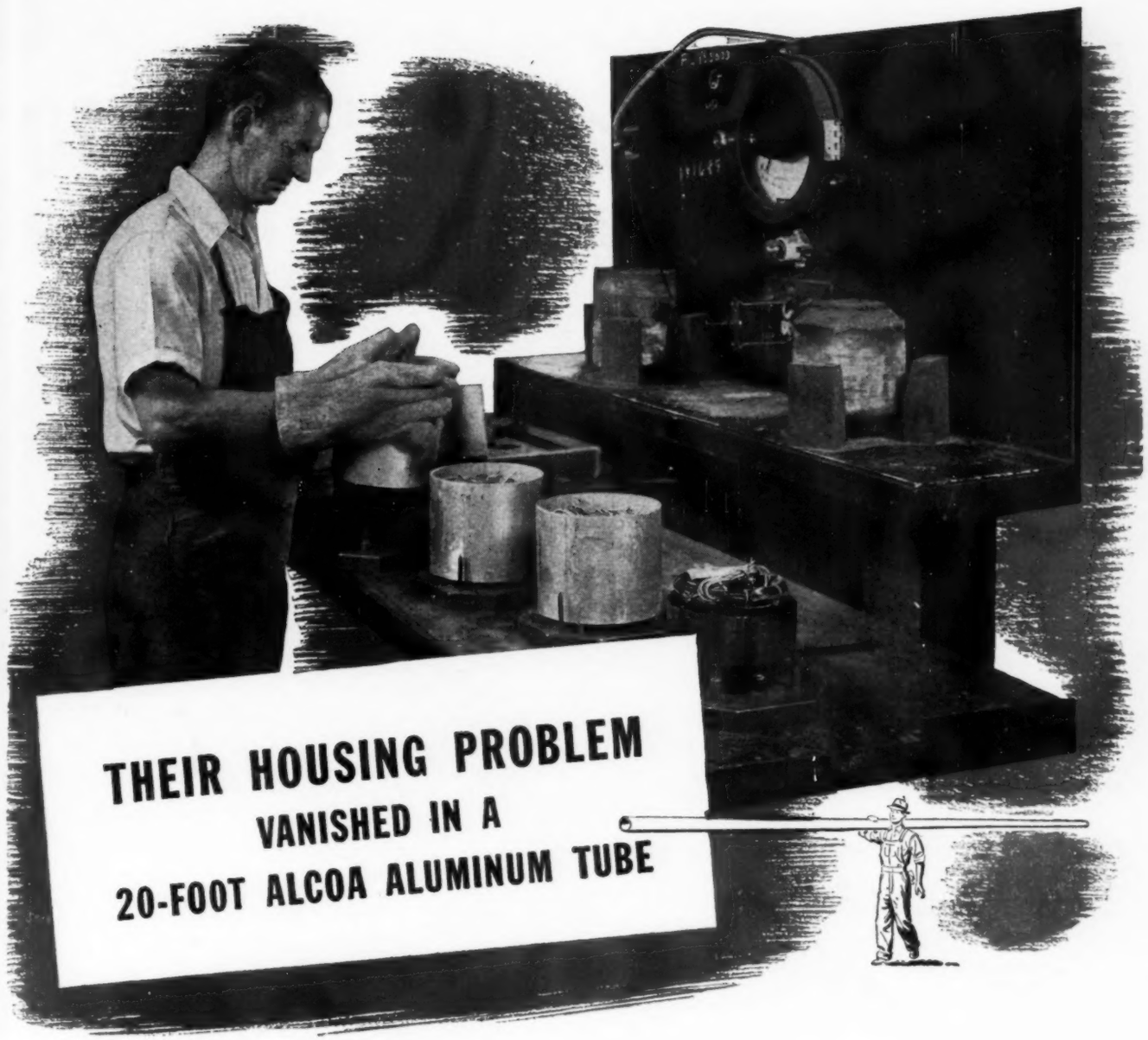
To make up for these higher costs and to maintain a satisfactory margin of profit without resorting to a steep rise in selling price, present management a serious problem.

If your production processes include turning of metal parts, a Warner & Swasey field engineer may be able to help you. After studying your jobs, he probably can recommend improved machines, new tools and methods, or suggest accessories to be added to your old turret lathes to make them more productive.

You can Machine it Better, Faster, for Less . . .
with a Warner & Swasey

WARNER & SWASEY
Machine Tools
Cleveland

TURRET LATHES, MULTIPLE SPINDLE AUTOMATICS, PRECISION TAPPING & THREADING MACHINES



THEIR HOUSING PROBLEM VANISHED IN A 20-FOOT ALCOA ALUMINUM TUBE

One slash with a cutoff saw, a couple of minor machining cuts on the ends of each sawed section, and 20-foot lengths of Alcoa Aluminum Tubes become housings for the electric motors made by Standard Dayton Corporation.

The tubes require no boring. They are merely heat-expanded and slipped over the stators. On cooling, they fit tightly.

What's more, the aluminum housings give a reduction of one-third in motor weight and faster dissipation of motor heat.

When you design a new product, or redesign one already on your assembly line, consider the many commercial forms of Alcoa Aluminum. And our 59 years of aluminum know-how is at your service. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Penna. Sales offices in leading cities.

MORE people want MORE aluminum for MORE uses than ever

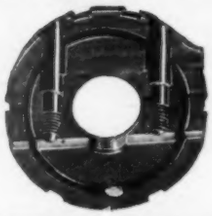
ALCOA FIRST IN ALUMINUM

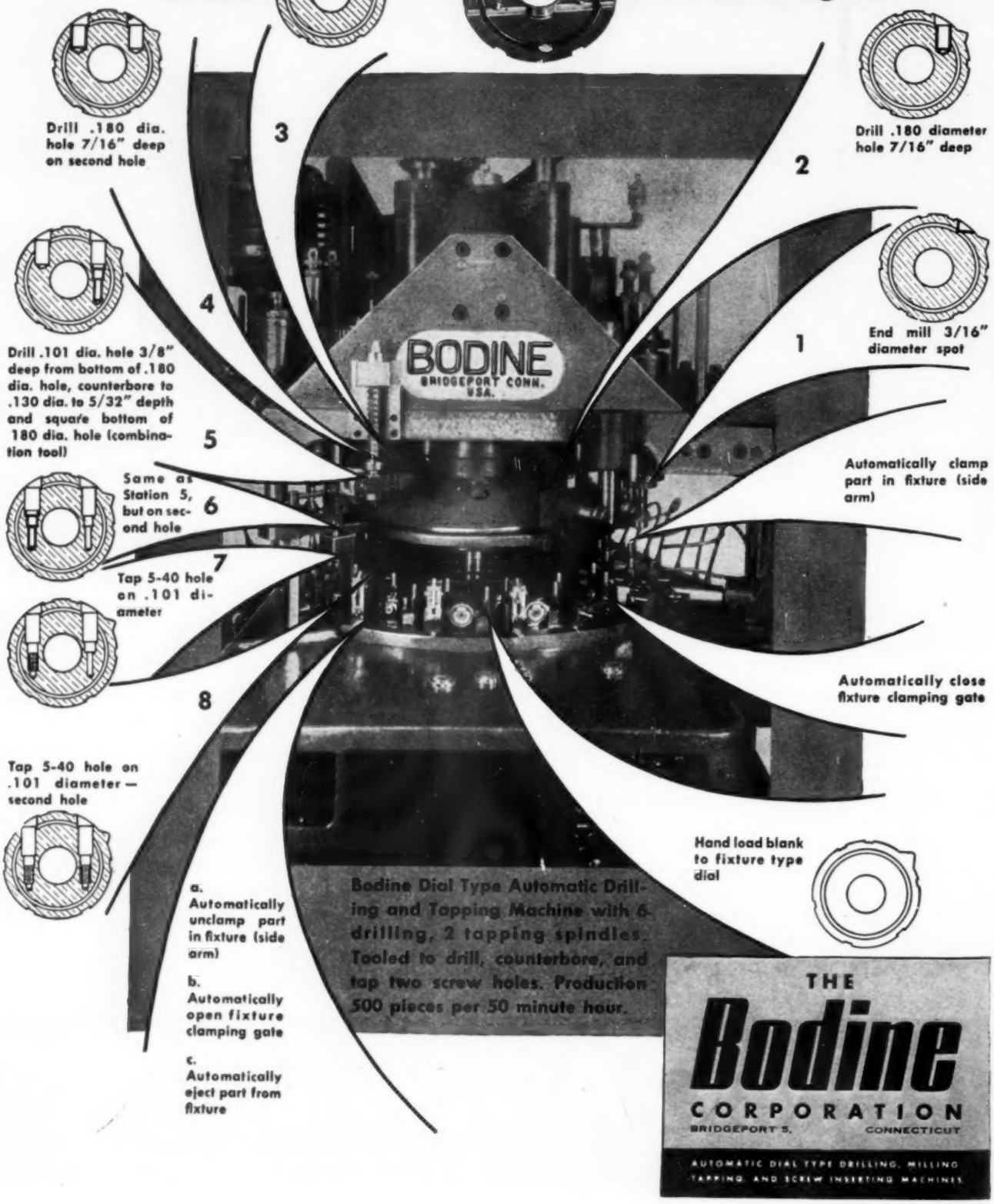
ALCOA ALUMINUM

IN EVERY COMMERCIAL FORM

Bodine..Case History No. 20

Processing a powdered metal *(bronze)* latching cam





1 End mill 3/16" diameter spot

2 Drill .180 diameter hole 7/16" deep

3 End mill 3/16" diameter spot on second hole

4 Drill .180 dia. hole 7/16" deep on second hole

5 Drill .101 dia. hole 3/8" deep from bottom of .180 dia. hole, counterbore to .130 dia. to 5/32" depth and square bottom of 180 dia. hole (combination tool)

6 Same as Station 5, but on second hole

7 Tap 5-40 hole on .101 diameter

8 Tap 5-40 hole on .101 diameter — second hole

a. Automatically unclamp part in fixture (side arm)

b. Automatically open fixture clamping gate

c. Automatically eject part from fixture

Automatically clamp part in fixture (side arm)

Automatically close fixture clamping gate

Hand load blank to fixture type dial

Bodine Dial Type Automatic Drilling and Tapping Machine with 6 drilling, 2 tapping spindles. Tooled to drill, counterbore, and tap two screw holes. Production 500 pieces per 50 minute hour.

THE **Bodine** CORPORATION
BRIDGEPORT 5, CONNECTICUT
AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

DRILL HIGHLY ABRASIVE MATERIALS WITH SOLID CARBIDE TWIST DRILLS—

You'll Find Type "C" Ace Drills More Efficient

Only through Ace Drill Corporation's unique "ground from the solid" process is the solid carbide twist drill possible.

Ace TYPE "C" Drills are solid carbide and are constructed with a heavy web and fast spiral, polished flutes to assure you peak efficiency when drilling abrasive non-ferrous metals and plastics.

The economy of using solid carbide twist drills is evident in the continuous production possible with these harder, more wear-resistant drills.

2393

★ WRITE FOR THE DESCRIPTIVE FOLDER ★

ACE DRILL CORPORATION

MANUFACTURERS OF GROUND-FROM-THE-SOLID DRILLS AND REAMERS

DETROIT 27, MICHIGAN

ARMSTRONG

More ARMSTRONG TOOL HOLDERS for *More* Profit

Whenever you tool a new operation with the correct ARMSTRONG TOOL HOLDER, you increase your profit. Each has the extra efficiency resulting from over 50 years of continuous development and refinement in designs; the extra strength resulting from modern metallurgy and manufacturing methods.

With ARMSTRONG TOOL HOLDERS you can take advantage of the new high speeds and heavier feeds of the newer cutting materials, without revolutionary changes or costly experimentation. They are the most profitable tools obtainable; the lowest in initial cost, the longest in service and most economical in use, for all incorporate the basic Armstrong Principle of small interchangeable cutter-bits in permanent drop forged shanks. They are the most readily obtainable tools too, for they are stocked by all leading distributors.

With emergencies, restrictions and controls passing, now is the time to tool up for normal business with more ARMSTRONG TOOL HOLDERS, for more profit.

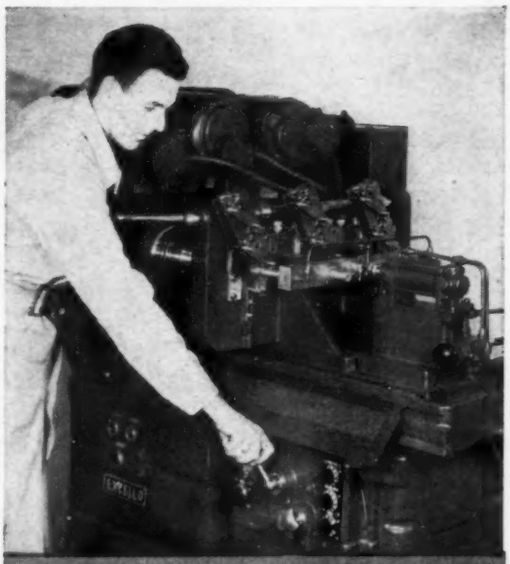
ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

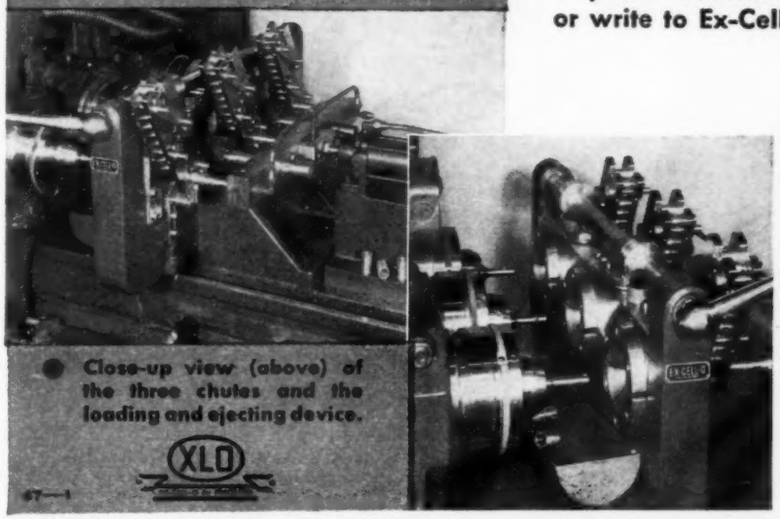
315 N. FRANCISCO AVE. CHICAGO 12, U.S.A.

Eastern Whse. & Sales Office: 199 Lafayette St., New York 12, N. Y.
Pacific Coast Whse. & Sales Office: 1275 Mission St., San Francisco 3, California

Are material and labor costs pinning you down?



● This Style 2112-A Ex-Cell-O Precision Boring Machine (above) is equipped with loading chutes and a hydraulically operated loading and ejecting device. The bushings shown in the loaded chutes are both semi-finished and finish bored at the rate of 666 pieces per hour net.



● Close-up view (above) of the three chutes and the loading and ejecting device.

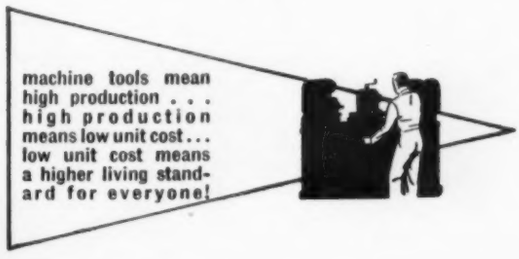
YOU CAN OFFSET THEM WITH EX-CELL-O PRECISION BORING MACHINES . . . *Here's Why:*

Ex-Cell-O Precision Boring Machines are designed to produce more parts per hour, at lower unit cost. Increased output enables you to keep up with rising labor costs; assured accuracy in the finished part also results in greater savings.

For example:

The Ex-Cell-O Style 2112-A Boring Machine illustrated here features three boring spindles, loading chutes that are filled during the boring cycle, and a hydraulically operated loading and ejecting device. The machine accommodates various size bushings up to 2″ diameter and 1¾″ long. Flexibility is obtained by adjustable loading chutes for various diameters, interchangeable clamping fixture inserts, interchangeable ends on loading and ejecting plungers, and interchangeable boring quills.

For high production at a minimum unit cost; for flexibility that permits profitable operation on a wide variety of parts—see the Ex-Cell-O representative in your locality or write to Ex-Cell-O at Detroit . . . *today!*


machine tools mean high production . . . high production means low unit cost . . . low unit cost means a higher living standard for everyone!

● This view (left) shows the three boring spindles with micrometer adjustable quills for fast tool setting, and the chute (between the spindles and the fixture) into which the finished bushings are ejected.

EX-CELL-O CORPORATION

DETROIT 6 MICHIGAN

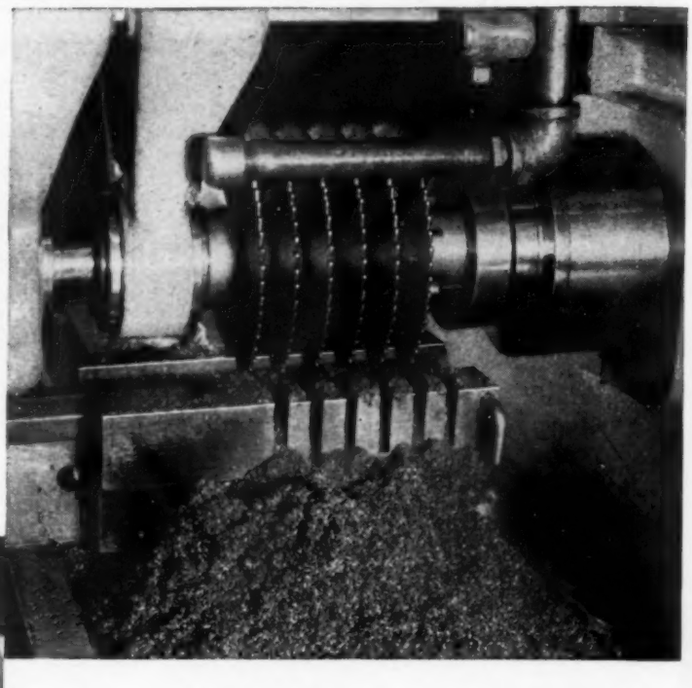
MANUFACTURERS OF PRECISION MACHINE TOOLS • CONTINENTAL CUTTING TOOLS • MISCELLANEOUS PRODUCTION PARTS • FUEL INJECTION EQUIPMENT • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • PURE-PAK PAPER MILK BOTTLE MACHINES

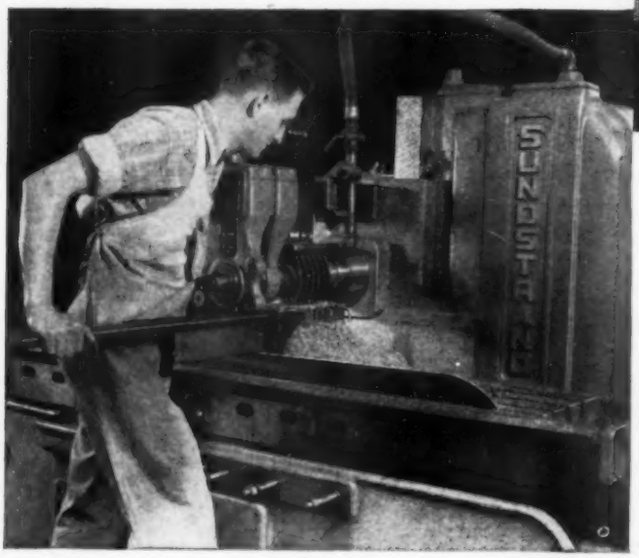
CUSTOMER REPORTS *Less* BREAKAGE *Fewer* SHARPENINGS WITH BARBER-COLMAN STANDARD MILLING CUTTERS

5000 PIECES PER SHARPENING . . . NO BREAKAGE . . . MILLING TOUGH NE-8617 STEEL WITH HARD SPOTS

These Barber-Colman Standard Metal Slitting Saws . . . delivered from stock . . . demonstrate low-cost, quick-delivery advantages of using Standard Cutters on short-run, high-production jobs.

The problem called for producing pressure lever dogs faster, and at lower cost by reducing the number of operations required. These were previously cut off as raw stock and then finish machined. Now formed steel bars are fed through a special fixture where a gang of six B-C Standard Saws cut off accurately to size 5 completed dogs per load. Cutting time is 2 minutes per load, and at the time this data was compiled, 5000 pieces had been machined without cutter breakage or resharpening.





Similar results can be obtained on your milling problems with Barber-Colman Standard Cutters. For those short-run, fast production jobs, specify Barber - Colman STANDARD. Be sure of low cost, quick delivery, and dependable performance.

WRITE TODAY— for Machinability Table and Cutting Oil Guide for use with Standard Cutters; also prices, sizes, feeds and speeds. Ask for Sheet No. 34 and Catalog LC.

BRIEF JOB FACTS

Cutters — Gang of B-C Standard Metal Slitting Saws, 8" dia. x ⅛" face x 1¼" hole.
Material — NE-8617 Steel, carburized — hard spots.
Operation — Cut-off milling 5 Pressure Lever Dogs per load; size of cut ⅜" x 1⅜" x 2⅛" long.
Feed — 2" per min. Speed — 95 S.F.M.
Cutting Time — 2 min. per load of 5 pieces.
Tool Life — 5000 pieces machined; no breakage; Cutters had not required resharpening.

MODERN MACHINES WITH ORDINARY CUTTING TOOLS ARE NOT FULLY EFFICIENT

BARBER B-C COLMAN

Barber-Colman Company

GENERAL OFFICES AND PLANT 111 LOOMIS STREET ROCKFORD, ILLINOIS U.S.A.

It's FREE

THE NEW LOVEJOY "CUTSALL"

Catalog Describing Tool-Bit Type Carboloy-Tipped Milling Cutters

Here is a brand new Lovejoy catalog filled with facts about Lovejoy's great new Cutsall Face and Step milling cutters. They are designed to profitably meet the most modern production demands. They have such features as interchangeable Carboloy tipped blades, rugged forged steel housings, provision for fine blade adjustment and secure blade locking. And in action they remove metal faster and cleaner than anything you've ever tried. It will pay you to fill in the coupon and mail it to Lovejoy today.

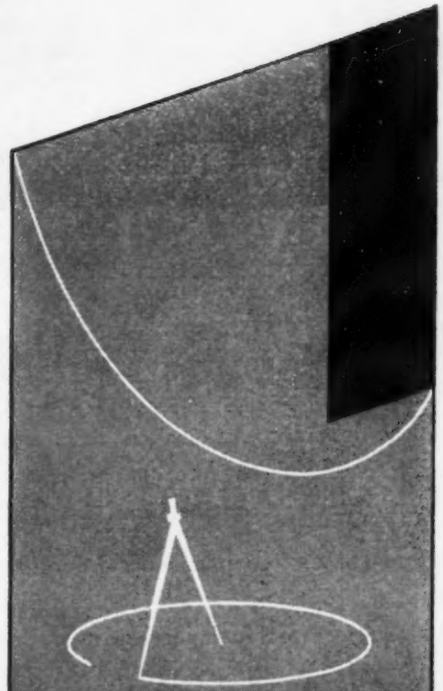
NAME_____ TITLE_____

COMPANY_____

STREET_____

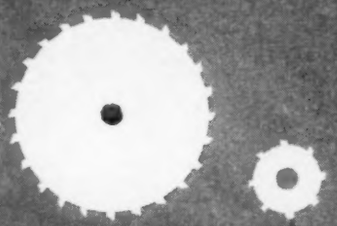
CITY_____ STATE_____

A. M.



DESIGN

A complete engineering service, backed by an experienced staff, is at your service to make recommendations and design special cutters.



RANGE

Hundreds of sizes, dozens of models to meet every requirement, regardless of machines used or materials to be cut.

SERVICE

Even special tools use standard parts which are stocked by us. There are 20 Lovejoy service centers throughout the U.S.A. — there is one near you.

30 YEARS' SATISFACTION

Nearly 30 years' continuous experience making milling cutters and other "Positive-Locking" tools. Our first customers are still buying our tools.

LOVEJOY TOOL COMPANY, INC.
SPRINGFIELD, VERMONT, U. S. A.

THE METALLURGIST IS "KING" AT KROPP FORGE

From Kropp's extensive metallurgical laboratory, issue the dictums that control the quality of every forging bearing the famous K

To determine the overall soundness of the forging steel, deep etch tests are employed. For hardenability check, the Jominy test, with the aid of Rockwell machines, is applied. Other acceptance tests include chemical analysis and physical tests, including tensile, hardness and cold bending performed on tensile machines.

Laboratory control extends into the forging shops for checking of heating and cooling rates, and to advise on technical production phases.

Heat treatment after forging is specified and controlled by the laboratory, which on completion conducts tests on the finished forging which is a final check on customer's specifications.

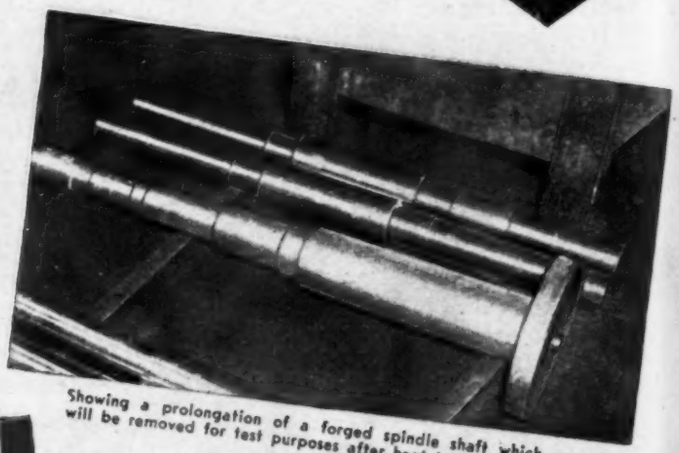
Specify Kropp flat die, drop and upset forgings. Call the nearest Kropp engineering representative, or send your inquiries direct for immediate quotation.

KROPP FORGE COMPANY

5301 West Roosevelt Road, Chicago 50, Illinois

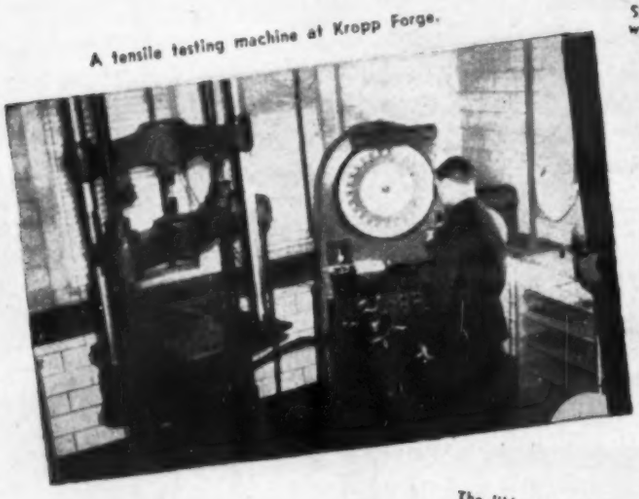
KROPP K

Specimen of forging stock, sliced and deep etched to bring out the pattern of the metal.



Showing a prolongation of a forged spindle shaft which will be removed for test purposes after heat treatment.

A tensile testing machine at Kropp Forge.



The "Heat Card" provides a permanent record of all tests run on a given heat of steel.

Opens New Channels TO *Low Cost* PRODUCTION

● When you see the new series KING with its new, powerful rams—controls at front of machine for operator's convenience—the increase in weight resulting in greater rigidity, you will understand why this new machine will take the heaviest cuts at the highest speeds modern cutting tools will withstand.

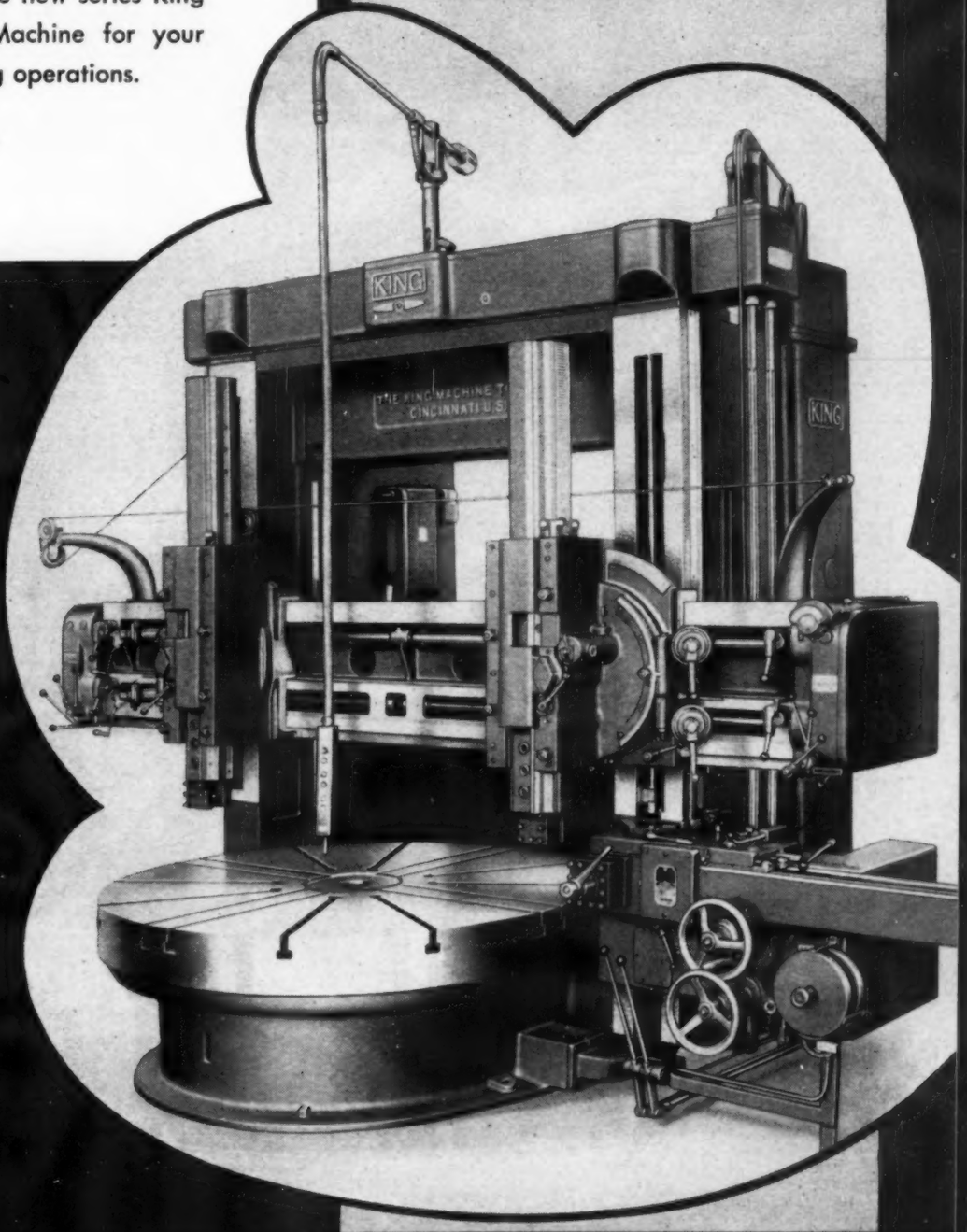
You will also understand why better results are obtained with carbide tools at costs that are consistently low.

It will pay you to investigate the new series King Vertical Boring and Turning Machine for your precision boring—turning—facing operations.

★

KING VERTICAL BORING AND TURNING MACHINE

★



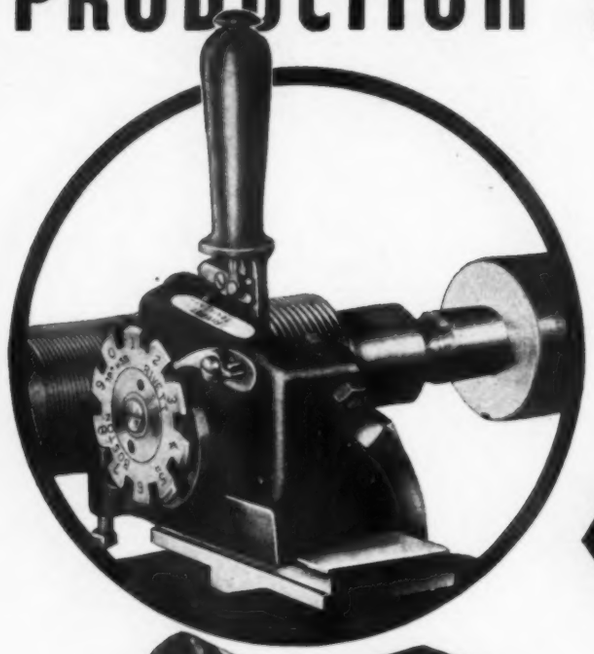
Available in ten sizes: 30", 36", 42", 52", 62", 72", 84", 100", 120" and 144".

THE KING MACHINE TOOL COMPANY

CINCINNATI 29, OHIO

Builders of Vertical Boring and Turning Machines Exclusively

PRODUCTION *Accessories to Lower* COSTS



THREAD TOOL

Mounts on any screw cutting lathe and replaces single point thread tools and chasers. Indexing system presents each of ten cutter teeth successively to the work allowing maximum cuts to produce a perfectly formed thread. Duplicates threads without gauging. Write for Bulletin 110.

LOCKJAW

New all purpose work clamp eliminates expensive bolting operations on millers, planers, grinders and drills. Stops work heaving, shimmying, yawing and buckling with sure-grip, locking pressure forward and downward. Write for Bulletin 140.

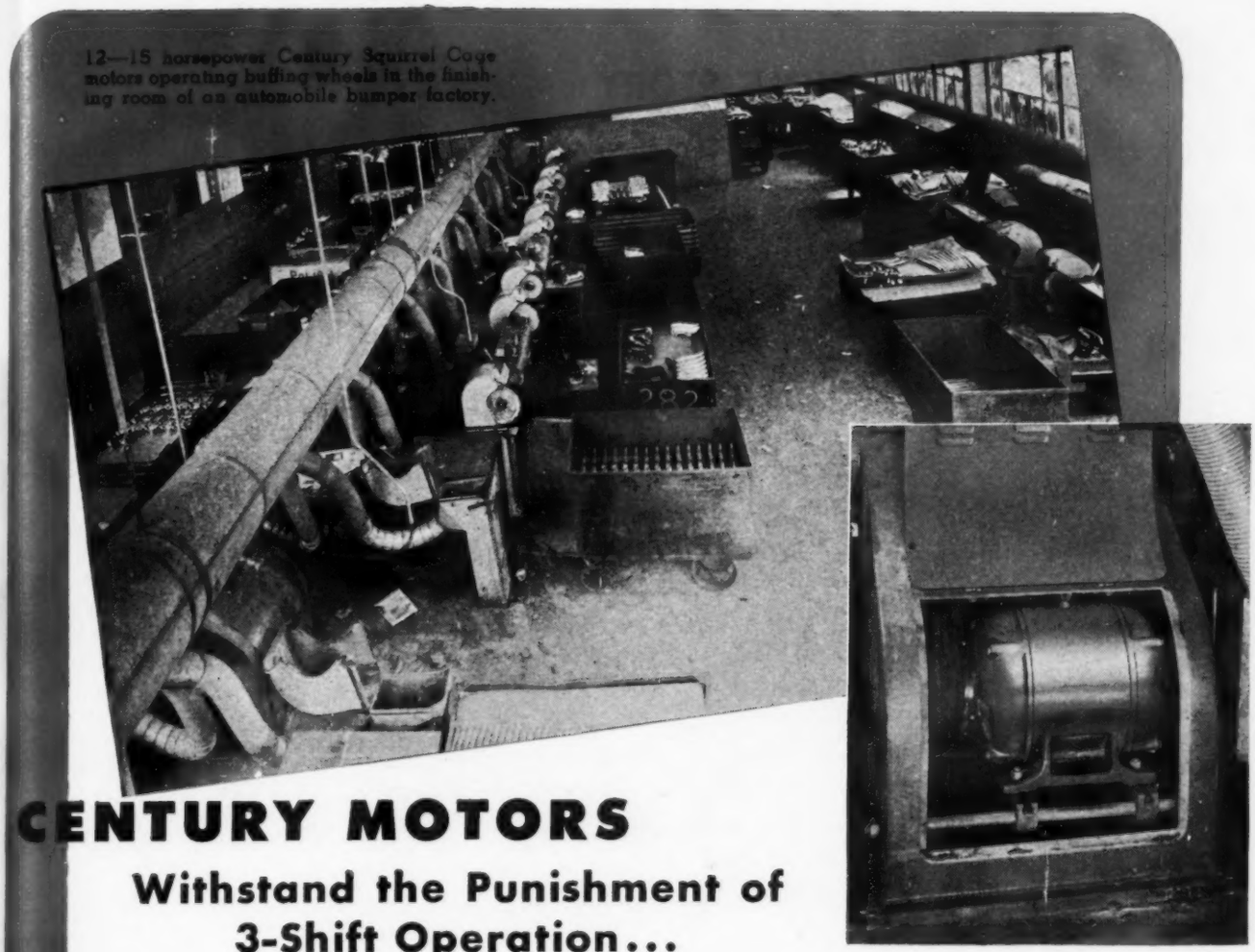
COLLETS

Lathes, milling machines and other tools can readily be equipped to use Rivett draw-in collets and step chucks. This self-centering, convenient method of chucking reduces time and increases precision on tool-room and production work. Write for Bulletin 100.

RIVETT

RIVETT LATHE & GRINDER, Inc.

BRIGHTON • BOSTON • MASS. • U. S. A.



12—15 horsepower Century Squirrel Cage motors operating buffing wheels in the finishing room of an automobile bumper factory.

CENTURY MOTORS

Withstand the Punishment of 3-Shift Operation...

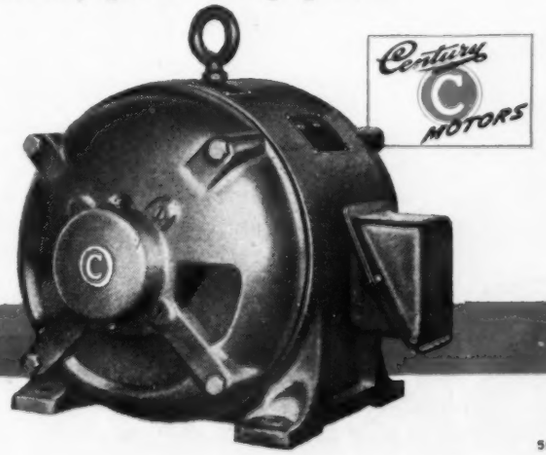
Reduce Loss of Time and Maintain Production

Twelve 15 horsepower Century Squirrel Cage motors (as shown above) operate buffing wheels from an enclosed base. Week after week—3 shifts a day—just as many thousands of other Century motors are doing in factories the world over.

Many Century design features contribute to their durability, such as: unusually rigid construction, accurately machined feet for solid mounting, good mechanical and electrical balance.

Century motors are built in a wide range of types in sizes from 1/6 to 400 horsepower to provide top performance to meet every electric power application.

Specify Century for all your electrically powered equipment.



CENTURY ELECTRIC COMPANY

1806 Pine Street • St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

507

THE HOLE STORY . . . *fast*

The new No. 212 Bryant Automatic Internal Grinder *roughs* and *trues* and *finishes* and *stops* automatically. It requires a minimum of operator attention. It has 9″ maximum swing — 3″ grinding traverse — 12″ total wheel traverse.

The wheelhead shown is the Bryant Hi-Frequency direct drive motor built to operate at speeds up to 100,000 R.P.M. The wheelhead is carried on a hardened and ground cylindrical slide.

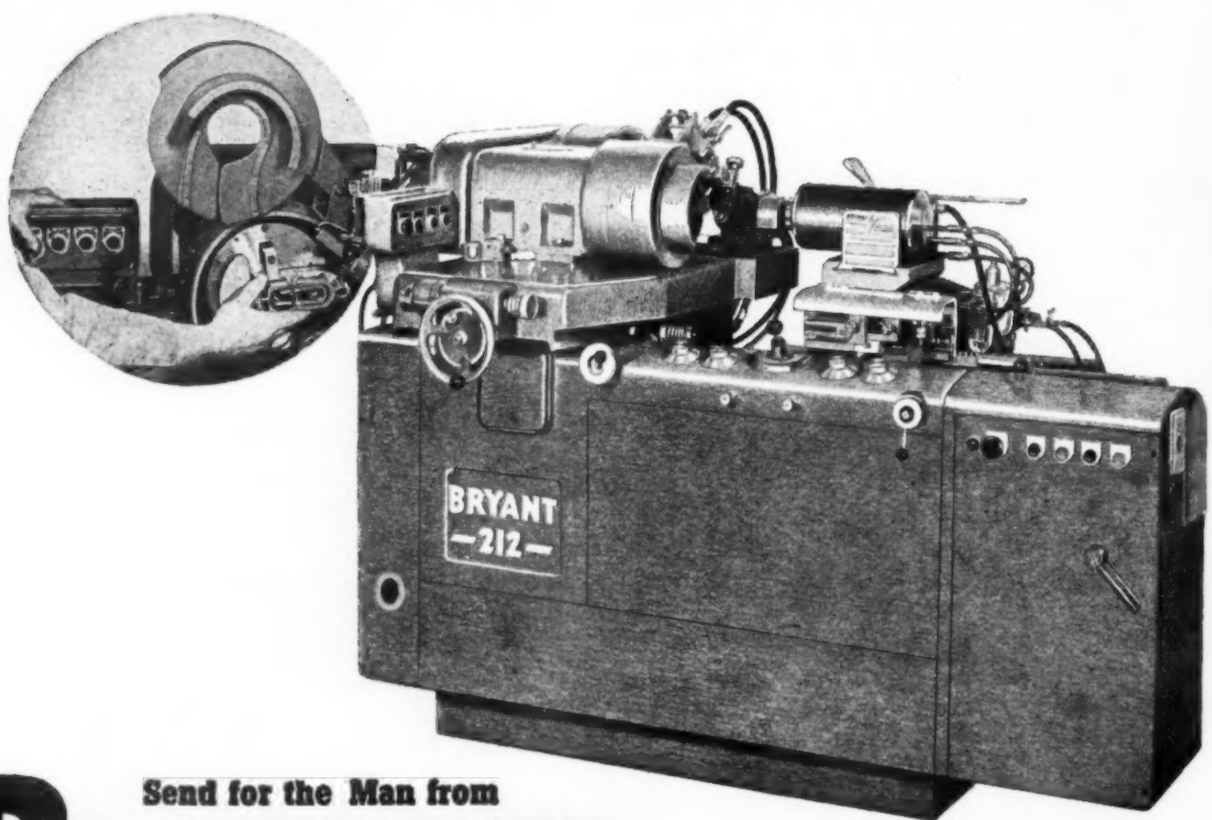
The cross-feed is in the work table which rides on anti-friction bearings and is controlled by a precision lead screw. The work spindle is mounted in preloaded ball bearings and is dynamically balanced to assure precision work.

An electrically controlled hydraulic system provides smooth operation and simple cycle change.

Automatic work sizing is accomplished by any of three methods: by a plug gage mounted in the work spindle; by a diamond contacting the bore; by the wheel trueing diamond.

Operator attention is further minimized by such features as convenient grouping of simplified controls and automatic pressure lubrication.

For a better product and a better profit, ask for further information on the Bryant No. 212 Automatic.



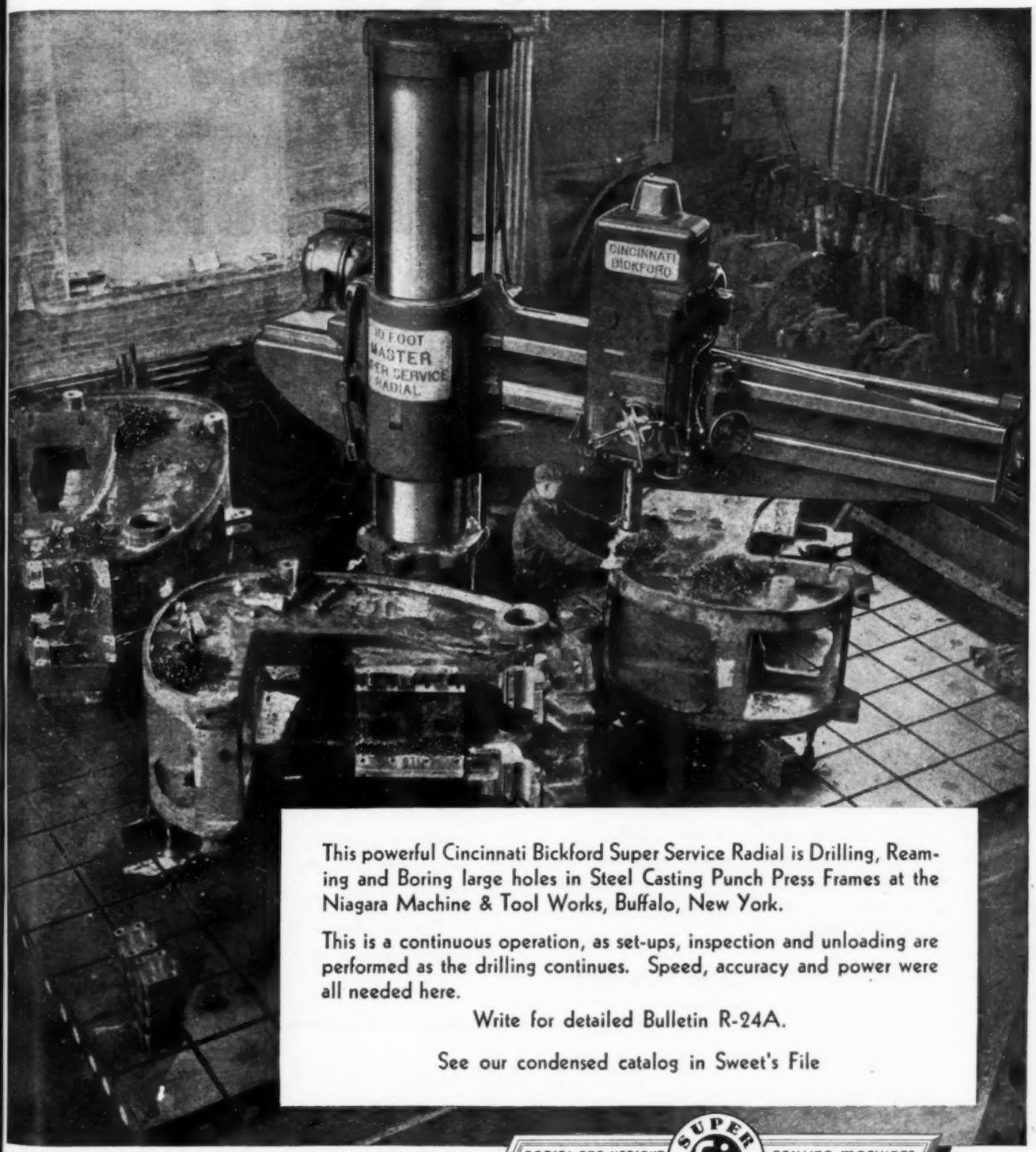
Send for the Man from

BRYANT

BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.

THE machine TO DO IT...



This powerful Cincinnati Bickford Super Service Radial is Drilling, Reaming and Boring large holes in Steel Casting Punch Press Frames at the Niagara Machine & Tool Works, Buffalo, New York.

This is a continuous operation, as set-ups, inspection and unloading are performed as the drilling continues. Speed, accuracy and power were all needed here.

Write for detailed Bulletin R-24A.

See our condensed catalog in Sweet's File

Courtesy of Niagara Machine & Tool Works, Buffalo, N. Y.

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A

Another SHELL INDUSTRIAL SERVICE!

HERE is an entirely new service designed to help you achieve more production from engine lathe equipment.

This book is the only one of its kind to combine, in one volume, the information that will bring managers, supervisors, operators, instructors, and beginners up-to-date on the complete function of all types of engine lathes.

Far more than a summary, this book utilizes a new technique in picture-and-word presentation. Nearly a thousand drawings, sketches, and photographs are used. Moreover, by combining pictures and definitions in chart "families", relationships and differences are brought out with but a fraction of the study time normally required.

Put this book to work for you! Send for your copy today . . . use the coupon below.

By all means, see this book!

Here are the chapter headings:

1. Fundamentals of Modern Machine Tools.
2. Features of Similarity of Modern Lathes.
3. Getting Acquainted with an Engine Lathe.
4. Getting Acquainted with Lathe Tools.
5. Performing Common Lathe Operations.
6. Common Lathe Jobs and How to Produce Them.
7. Getting the Most Out of an Engine Lathe.
8. Cutting Fluids.

COMPLETE IN ONE VOLUME

Sturdily Bound, Attractive Cover, Price $7.50

SHELL

SHELL OIL COMPANY, INCORPORATED

East of Rockies, 50 West 50th Street, New York 20, New York
Rockies and West, 100 Bush Street, San Francisco 6, Calif.

Enclosed find check or money order for $..... Please send ... copies of "Changing the Shape of Metals with an Engine Lathe" to:

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American Machinist's

Spot NEWS OF METALWORKING

Redemption of government bonds by employees in metalworking industries went up sharply when strikes were on, showed a corresponding decline when production was resumed.

British expect to have jet turbine commercial planes in operation in next 12 months. They are at least a year or more ahead of U. S. in development of jet turbine aircraft engines.

What used to be called the black market is flourishing in steel today, particularly in sheets. Prices are around $200 a ton, sales are handled by brokers. Steel is reported to come from normally loose "seconds" market, misuse of CPA ratings, excess stock in hands of some users who are tempted to sell at big profit, and trade deals with scrap interests. Steel mills shun these practices.

Washington is trying to decide whether to help Latin American nations arm themselves with U. S. type of military equipment. There is advantage for U. S. in having our weapons as standard throughout the hemisphere. British and others would like to do the job, are flirting violently on this subject with South American countries, particularly Argentina.

Razor blade demand is so big that one company is subcontracting half its business, despite fact that lack of production control and of specific finish requirements make subcontracting undesirable. Substantial part of current orders is for export to meet needs formerly served by European branch plants devastated by war.

Early passage of revised Case Bill appears certain as Congress begins hearings on new labor laws. It would create federal mediation board without compulsory powers, restrict bargaining privileges of foremen, make unions subject to suit, ban secondary boycotts and require union registration. Chances of outlawing closed shop and industry-wide bargaining are considered poor.

War Department has one "under-wraps" development department so secret that it is not listed anywhere. It secures appropriations through another department.

Rebuilding automobile engines has grown into "big-league" business. One company alone is rebuilding 6000 motors a month, expects to continue this rate indefinitely. This trend is based on the motorist's discovery during war that he can run his car a lot further than he previously had thought.

Russians have had unhappy experience with removal of German metalworking plants to their own country. They have changed tactics and are trying to increase output of factories in Germany. Soviet is encouraging formation of new German companies with 51% of stock owned by Russia.

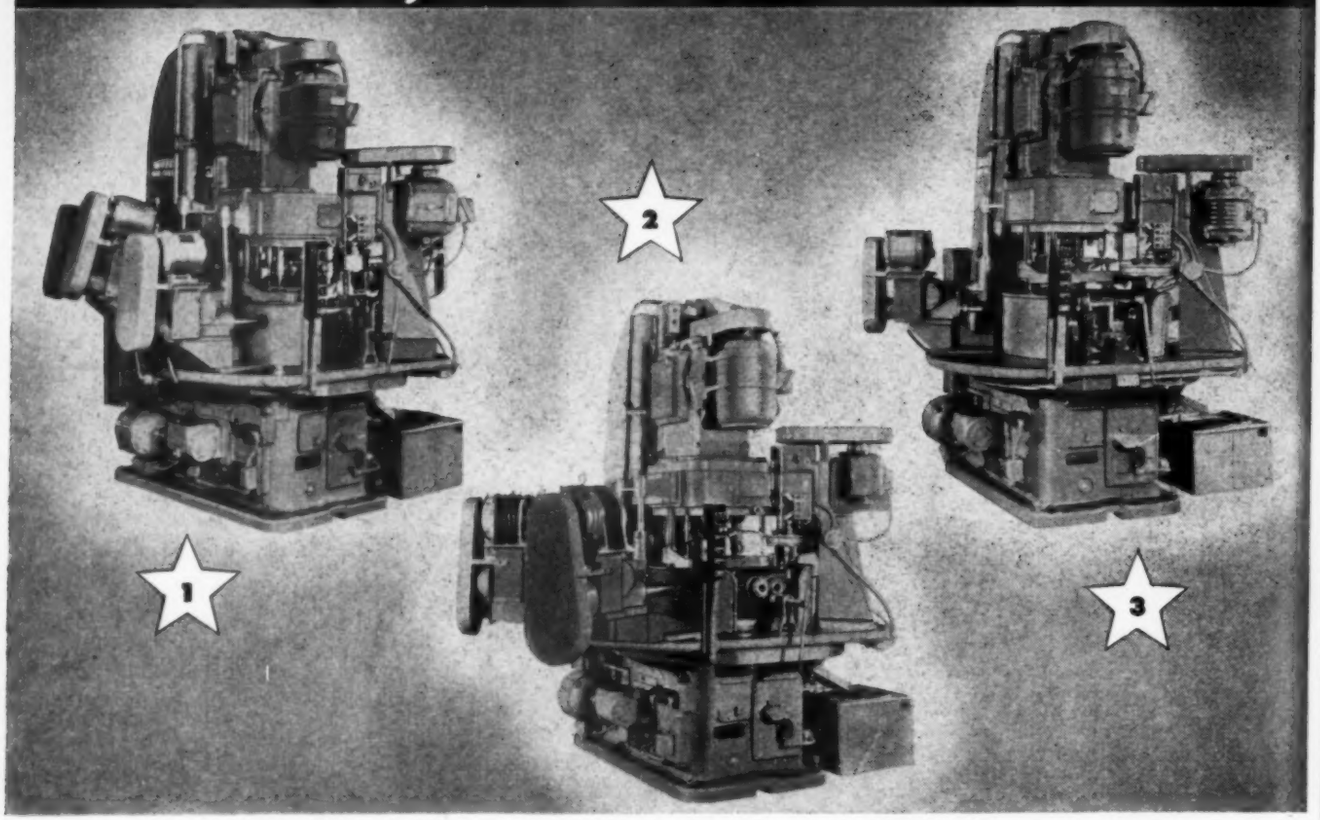
Note to export-minded metalworking firms: U. S. is likely to export $8 billion of goods this year, import $5½ billion. Difference will be largely offset by loans. It is estimated, however, that there is $20 billion in gold outside U. S. Such countries as South Africa and Argentina, for example, have plenty of cash with which to purchase goods here.

Congress is expected to enact restrictive portal-to-portal pay legislation within 30 days, but high Senate authorities say issue probably won't be settled for a year, with Supreme Court giving final verdict.

Sales of surplus machine tools have increased 300-500% since fixed prices were established. Sales by dealers during calendar year 1946 were $198 million (acquisition cost) at recovery value of $87 million, or 44%. These figures do not include "on location" (warehouse) sales. December dealer sales totaled $24 millions, original value, recovery value having been $7.8 millions, or 32%.

(Further news on pages 117-128)

MORRIS MOR-SPEED
High Production Trio



● This group of machines was designed and built by Morris to perform a series of operations on a transmission part and the three machines function as a battery—the work moving from one to the other. All three of these are Hydraulic Vertical Type Machines with automatic indexing.

No. 1 has 8 vertical spindles—2 tapping spindles—and 5 angular heads each carrying one spindle set at different angles. The angle heads are on the platen, have individual motor drives and are fed through racks and pinions connected to the vertical feed hydraulic unit. All spindle feeds, except the tapping spindles, are controlled by the movement of one hydraulic unit. The Tap Head has individual reversing motor drive with thread screw lead. This machine is set up for drilling—facing—rough and finish reaming—counterboring and tapping operations. No. 2 has 7 vertical spindles—3 horizontal boring spindles and 1 tapping spindle. The machine handles drilling — reaming — facing—chamfering—boring and tapping operations.

No. 3 has 16 vertical spindles—2 horizontal spindles and one tap head with 3 spindles. It is a six station machine for drilling—reaming—countersinking—counterboring and tapping operations.

If you are interested in equipment to meet specific job requirements, at a high productive rate, and at low cost—consult Morris. They have the engineering and manufacturing facilities and mechanical "know how" to help you.

Builders of MOR-SPEED Radials

The MORRIS Machine Tool Co.

CINCINNATI 3, OHIO

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

The Time Is Late

Why is it that government officials are just now getting started on putting aside surplus machine tools for a future emergency?

Suddenly 18 months after the Japanese surrender, teams of Army men are scurrying about earmarking machines which should be kept. The armed services are pressing machine tool builders for lists of machines produced during the war that should be stored against possible future use.

This task should have begun before the war ended. Instead Washington officials frittered away months during which the "arsenal of democracy"—the like of which the world had never before seen—was permitted to disintegrate. In fact, it has deliberately been dismantled. Its resources, in plants and machines, have been largely dissipated, so far as immediate help in an emergency is concerned.

Entire plants should have been retained intact. They were not. Entire production lines should have been frozen and not "cannibalized." They were not.

Even precious special machines, invaluable in ordnance manufacture, machines which take many months to produce, have been on the verge of being sold for scrap.

One of the excuses for this appalling negligence and lack of action is that the services do not have appropriations for buying these machines which other government agencies own.

Because no way has been figured out of cutting Washington's red tape, because government officials aren't smart enough to work out a way to transfer an asset from their left hand to their right hand, our future defense is to be jeopardized!

To be sure, we don't know exactly what weapons will be needed in the next emergency or what machines will be required to produce our future weapons. As a matter of fact, we are not certain exactly what plants may be essential.

The least we can do, however, is to play safe. Let's keep too much rather than too little.

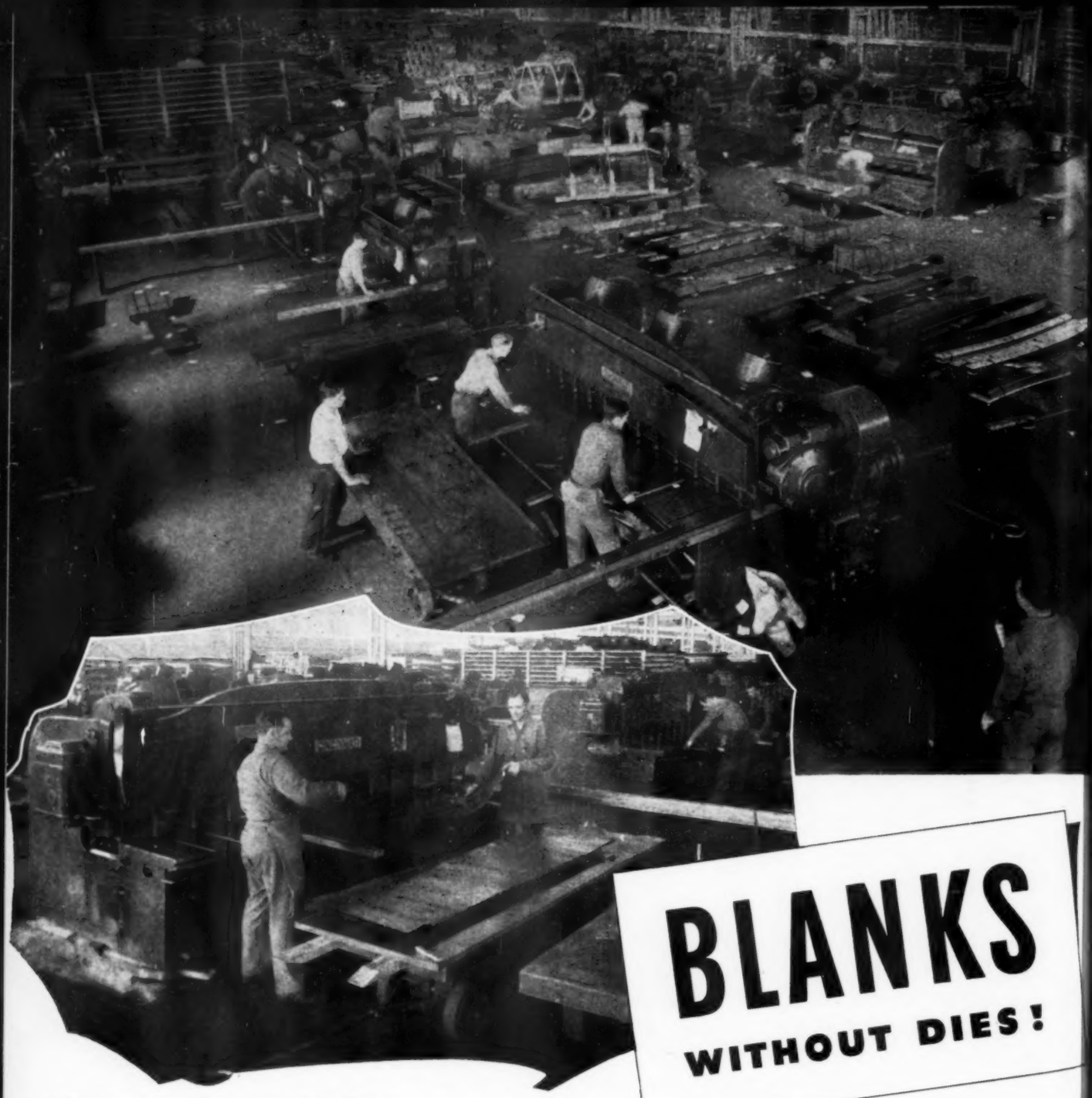
In an emergency you begin to use what you have. You can't wait until you get an ideal production setup. That is why it is so important for us to retain the best of what we've got now, because we know that it is a lot better than the best that anybody else has.

The time is late to begin this task. It is too late to do all that should have been done, because some of the machines are gone already. But let's get busy and do a real job of putting aside an ample supply of what is left.

If we do that, we will feel more comfortable if a future emergency arises than we did when the war struck us with full force in the early 40's and we were caught unprepared.

Burnham Finney

EDITOR



BLANKS
WITHOUT DIES!

• *Courtesy—Central Steel and Wire Co.*

Cincinnati Shears have reduced costs sharply in the production of straight-sided blanks.

The exceptional accuracy of Cincinnati Shears—the ability to cut to thousandths of an inch—the ability to cut straight—all mean accurate, true blanks without dies.

The flexibility of Cincinnati Shears—the power to produce endless sizes of straight-sided blanks—the rapid, convenient gauging—all contribute to the cost reduction.

Our representative will be glad to discuss Cincinnati Shears with you.

Write for Catalog S-4 for a description of the Cincinnati Line of All-Steel Shears.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

"For Quality, We Chose..

MODERN FINISHING METHODS"

BY L. A. BROWN
VICE-PRESIDENT IN CHARGE OF MANUFACTURING, LANDERS FRARY & CLARK

PORCELAIN-ENAMEL FINISH COAT is sprayed in air-conditioned booths. Conveyor fixtures accommodate washing-machine tubs and range cubicles, and can be rotated by power while enamel is applied

Instead of restoring the prewar installations, we preferred to establish facilities which will guarantee our future competitive position for both quality and cost

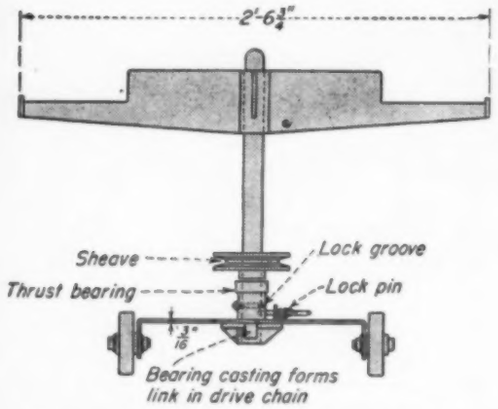
DURING THE WAR, our electric range and washing machine division was completely converted to munitions manufacture. (For example, the porcelain enameling plant was torn out to make room for machining and assembly of gun mounts.) So when peace returned we had a rare opportunity to start from scratch in planning the most modern facilities for finishing range and washer parts with porcelain and synthetic enamels.

This objective was not easy to achieve. In the first place, our firm is over 100 years old, and its buildings were erected at various times. Second, we make many products under the "Universal" trademark, and could not afford to take floor space from other manufacturing divisions. Third, the program would conceivably cost a great deal of money and effort.

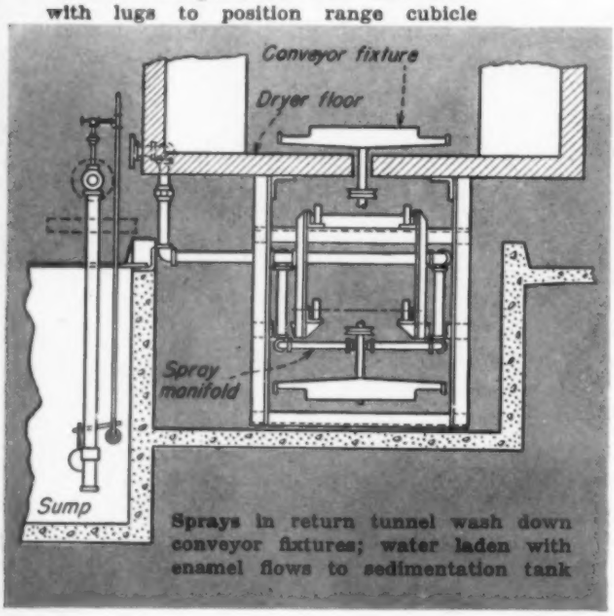
All things considered, it seemed best to turn over the engineering and layout problems to Anderson-Nichols & Company, engineering consultants, while our own organization wrestled with resuming production of other lines. This proved to be a wise decision. The engineers were able to fit the most modern straight-line flow facilities into our buildings and enlisted the aid of equipment

WORK FLOW IN PORCELAIN ENAMELING DEPARTMENT

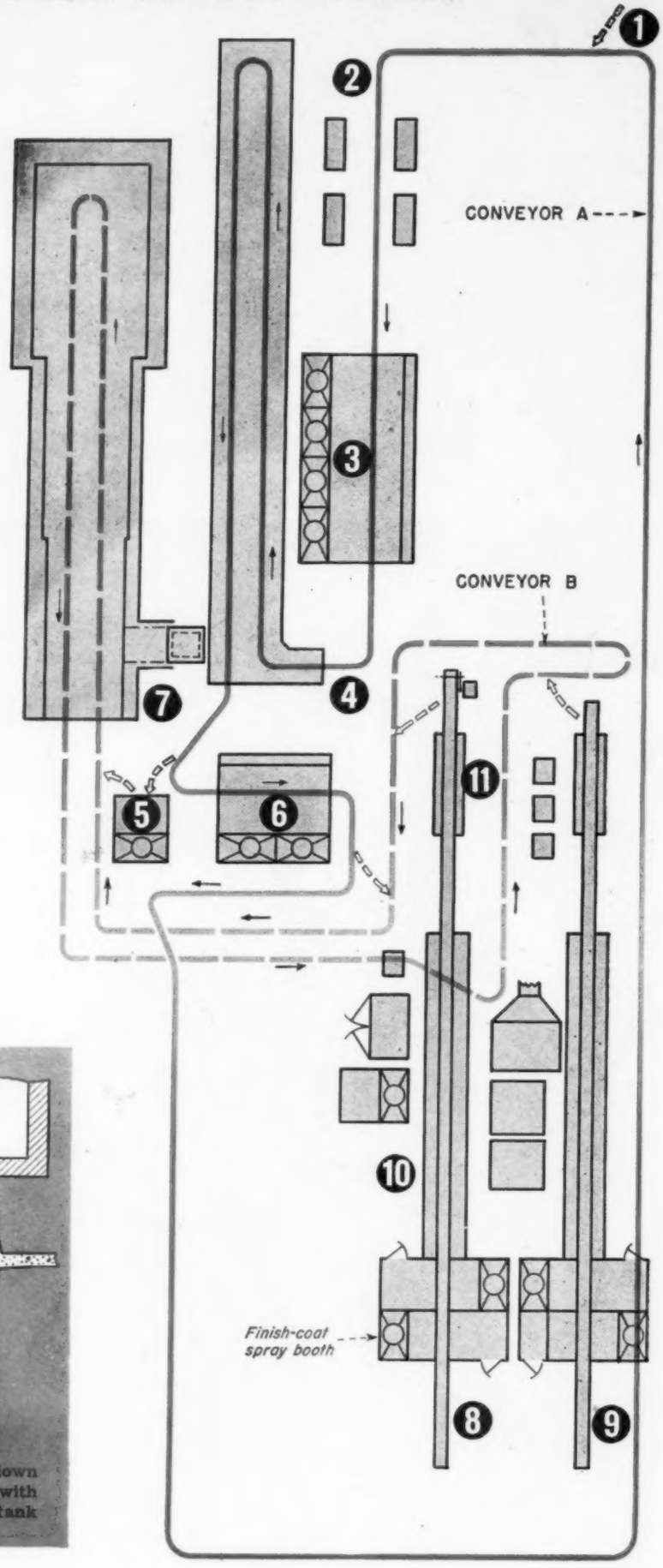
Station	Operation
1	Ware transferred from pickling-machine conveyor to ground-coat conveyor A
2	Dip ware if possible
3	Spray ground coat where dipping is not practical
4	Dry ground coat
5	Black-edge washing machine tubs, transfer to conveyor B
6	Black-edge other ware, transfer to conveyor B
7	Fire ground coat, then transfer ware to storage trucks for movement to finish coat lines. Note: Loop of conveyor A passes stations 8 and 9 to serve standby furnace, not shown
8	Spray finish coat on washing machine tubs and range cubicles
9	Spray finish coat on flat ware
10	Drying oven for tubs and cubicles
11	Brush tubs and cubicles and transfer to conveyor B for firing

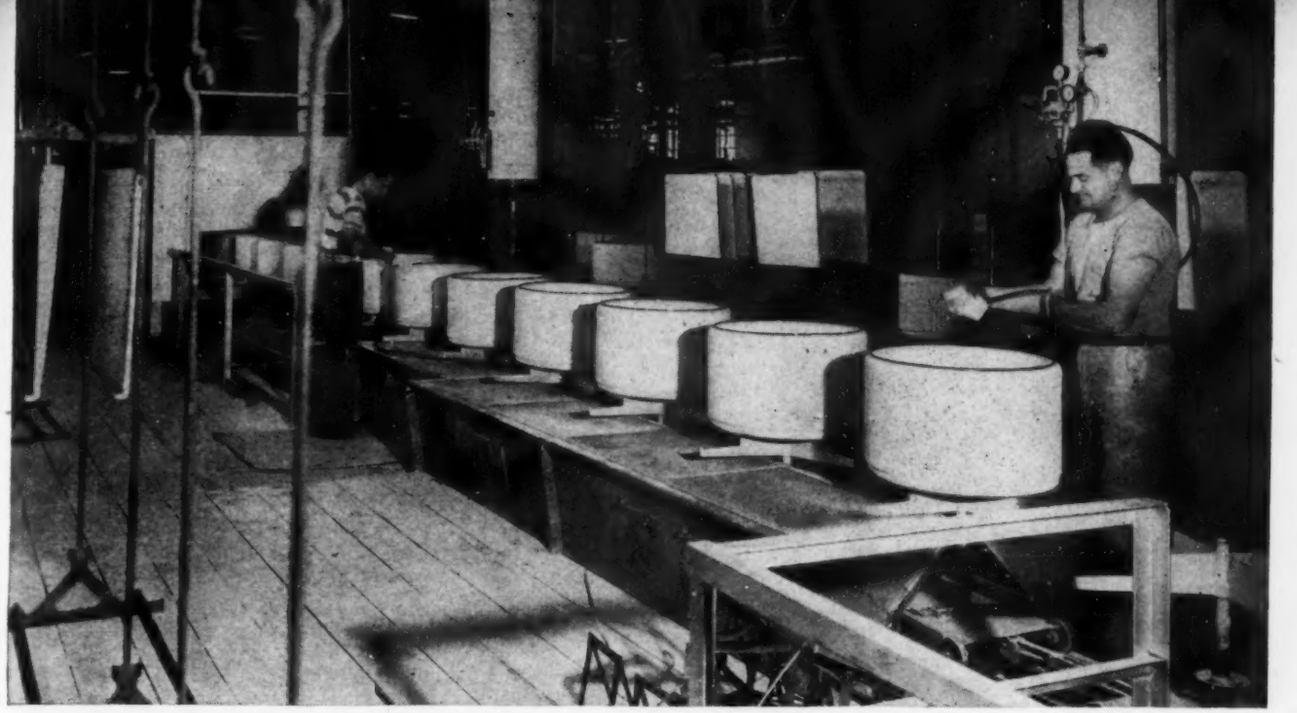


Finish-coat conveyor fixture has a pilot to locate washing-machine tub and arms with lugs to position range cubicle



Sprays in return tunnel wash down conveyor fixtures; water laden with enamel flows to sedimentation tank





DRY BISQUE IS BRUSHED from black edges of washing-machine tubs as they emerge from the drying oven. Frit sucked down through conveyor grating is caught by Binks Dynaprecipitors

suppliers in designing certain items which bear an important relationship to the lower costs and better quality which we currently enjoy. Particular attention was paid to cleanliness and reducing non-productive labor. In short, our reconversion program involved: (1) the substitution of automatic spray pickling for the usual vat method; (2) a conveyorized porcelain enameling plant, and (3) completely new spray bonderizing unit, air-conditioned spray room and equipment for white synthetic enamel. Details follow.

Porcelain Enameling Under Precise Control

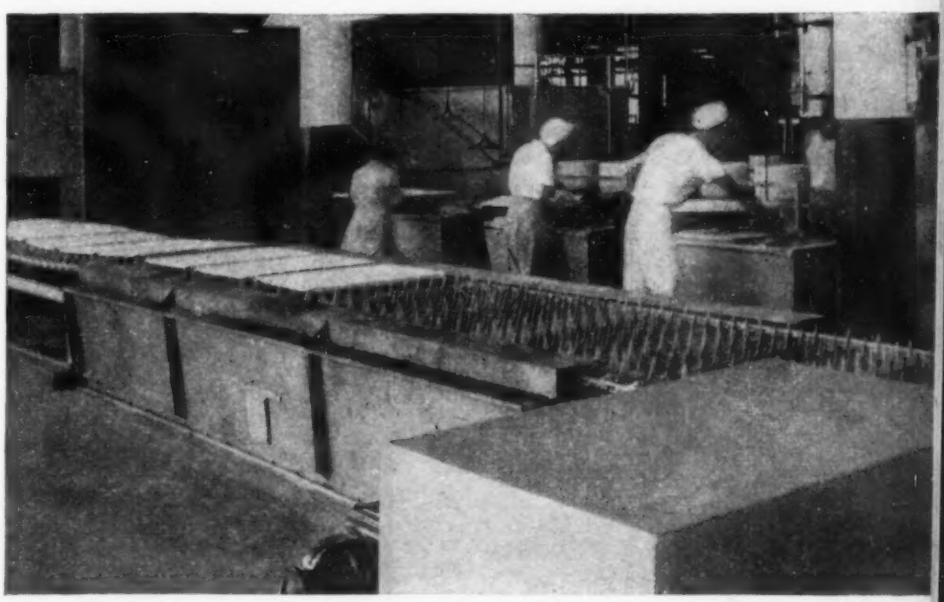
Our prewar porcelain enameling plant was equipped with one continuous and two box type furnaces. The postwar program was set up to achieve: (1) the highest quality of work, (2) lower costs by fewer rejections and mechanical handling. The plan, as developed by Ferro Enamel Corporation under the direction of Anderson-Nichols & Company, consultants, included a large continuous furnace and complete modernization of the layout.

Material to be enameled is pickled in an automatic machine (described on a following page) and then is transferred to the ground-coat conveyor *A* at 1 in the porcelain enameling plant (see layout drawing).

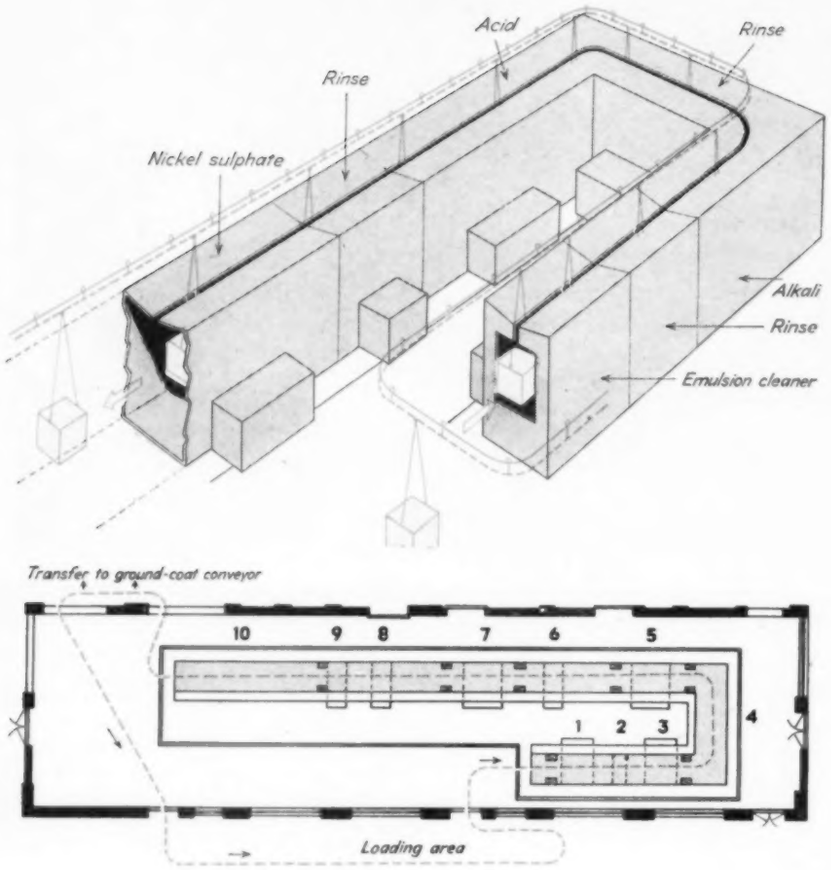
Because dipping is cheaper for tubs and many flat range parts, these are picked off the conveyor racks and dipped in portable tanks at 2, then rehung on the conveyor. Range cubicles, of necessity, pass to a ground-coat spray booth at 3. Ground-coated ware, passes into a convection dryer 4, for which about 50% of heat input is obtained from recuperators adjacent to the high-temperature ware-firing furnace, the balance being supplied by oil-fired air heaters.

Washing-machine tubs are taken from conveyor *A* and passed into black-edging spray booth No. 1, at 5 then hung on the furnace conveyor *B*. Other ware remains on conveyor *A* while it traverses black-edging booth No. 2 at 6, and is then transferred to conveyor B. This conveyor is equipped with racks for both round and flat work, also range cubicles.

The Ferro high-temperature furnace at 7 is a U-type, indirect, oil-fired muffle design. To protect the conveyor chain from damage by the 1550 F. furnace temperature, it is shielded with overlapping plates. There is no cross draft within the furnace, but a fan at the seal throws heat from the fired ware onto the



PIN-TYPE FIXTURES for flat panels enable operators to spray the edges as well as top surface. Work with black edges is transferred to brushing tables at rear of conveyor for line 9



TYPICAL CYCLE OF AUTOMATIC PICKLING MACHINE FOR PORCELAIN ENAMEL

STATION	SPRAY SOLUTION	STRENGTH	TEMP.	TIME, MIN.
1	Emulsion cleaner		160F	1¼
2	Cold water	—	—	⅓
3	Alkali cleaner	½ to 1½ oz./g.	160F	1¼
4	Cold water	—	—	1
5	Sulphuric acid	7-12%	150F	2½
6	Cold water	—	—	1
7	Nickel (Single salts)	1½ to 3 oz./g.	170F	2½
8	Cold water	—	—	1
9	Neutralizer (Soda ash and borax)	0.45 to 0.55% Na_2O	155F	¾
10	Air Blast	—	220F	5

incoming work to get rapid heat-up.

After firing, ground coat ware is inspected. Material requiring a finish coat is transferred to shop trucks and transported to unloading stations at the cover-coat spray booths 8 and 9. Other parts are sent to storage.

Two types of conveyor fixtures were designed by Ferro Enamel Corporation to transport work through the cover-coat spraying, drying and brushing lines. Washing-machine tubs and range cubicles are handled exclusively on line 8. The fixture (sketched) is rotated by power when spraying is in progress. A pilot in the top of the fixture engages a hole in the bottom of the tub. Lugs on the ends of the fixture arms locate and hold range cubicles.

Flat pieces like range tops are handled on line 9. Here the fixtures have pins or saw-tooth projections on top to raise the ware clear for spraying the edges, and avoid chipping the dry bisque when brushing the edges.

Spray booths are air conditioned and make-up air for the gas-fired ovens built by Drying Systems, Inc., is likewise filtered. When washing-machine tubs enter the spray booth on line 8, the first operator sprays the interior; a second operator, the exterior. After leaving the drying oven, the black edges are brushed on the run-out section of the conveyor, and the dry bisque is sucked into a grating by downdraft.

Conveyor fixtures are washed by water jets before traversing the return tunnel. The water and enamel frit flow into a sedimentation basin. Because of the cleanliness maintained in the plant, the reclaimed white enamel can be re-used without addition of new material. Brushed work from lines 8 and 9 is hung on conveyor B and sent to the high-temperature furnace for firing.

Automatic Spray Pickling Aids Porcelain Enameling

Pickling is too often associated with fumes, wet floors, disgruntled workers and expense for both workpiece rejections and repairs to equipment. Landers Frary & Clark wanted none of these troubles in its new setup for pickling of porcelain-enameled ware. Outcome of this decision was the installation of an automatic spray pickling machine. This machine, an outgrowth of practices developed by Metalwash Machinery Company for cleaning shell cases, needs no attention other than loading and unloading, plus routine control of solutions and changes in conveyor speed to suit the items in process. Besides a 50% gain in production, the installation shows these further advantages:

1. All soil, soap, drawing compound, rust and scale are removed from washing-machine tubs, range bodies and other sheet-metal items that require porcelain enameling. Besides, the etching action is so thorough and uniform that less-expensive grades of steel can be used for porcelain-enameling purposes. The uniformity of results achieved is obtained by use of sprays impinging on the work from all angles.

2. No in-process rusting or oxidation can occur. The work is kept wet until it reaches the drying oven, from which it emerges properly dried and neutralized. Conveyor racks are designed for good drainage of parts.

3. Quality of pickling is independent of the human element. One worker at the loading station puts parts in the conveyor racks; another man at the exit end removes the pieces and transfers them to the dipping station.

4. The sheet metal is given a uniform coating of nickel sulphate, according to recommended practice. Iron deposits are avoided by a continuous filtration to remove iron hydroxide sludge.

5. Fume-laden vapors cannot escape into the shop or atmosphere. Ventilating air, sucked into the acid and caustic stations of the machine, passes to two water-spray air scrubbers, which discharge only moist air to atmosphere.

6. Maintenance charges will be low because of materials selected for the several stations of machine and the ventilating method employed.

7. Materials-handling charges are reduced because it is possible to set this automatic spray pickling machine directly in the production setup, instead of handling the operation by old-fashioned methods in a remote location.

Plant Obstacles Overcome On Synthetic Enamel Line

Certain parts of electric ranges and washing machines, also the jackets of hot-water heaters, must be finished in white synthetic enamel. When considering the finishing of approximately 640,000 lb. of sheet metal per month, spread over thousands of pieces, these problems presented themselves:

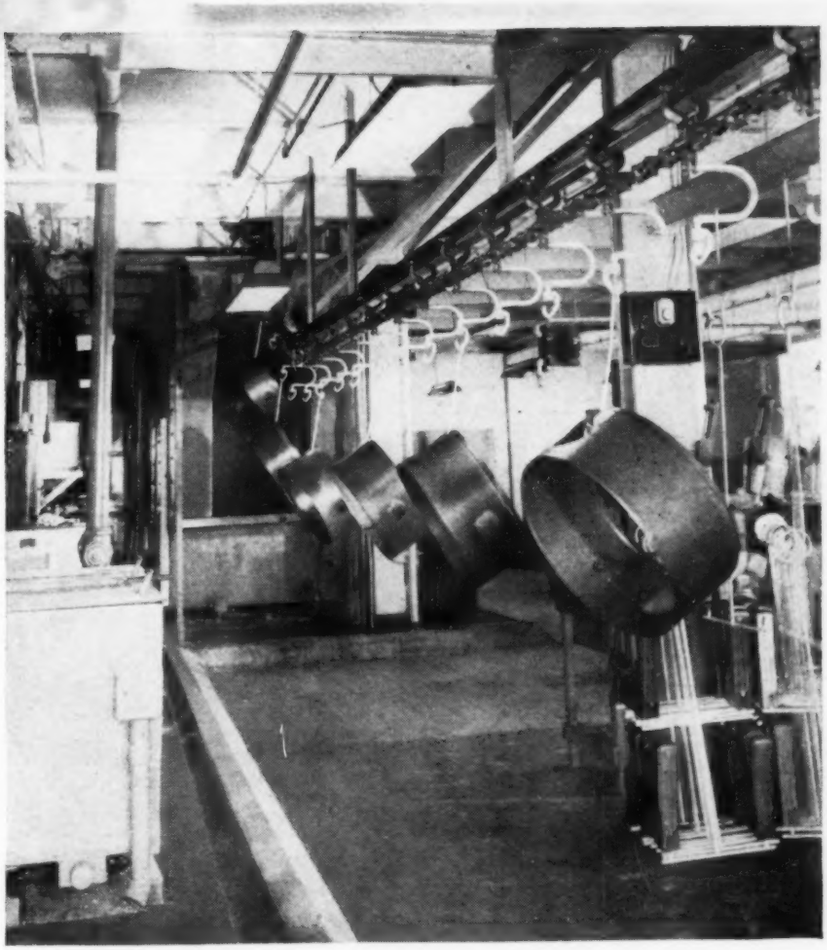
1. Continuous flow production was deemed essential for cost reasons.

2. But no single floor in available buildings gave enough space for the installations visualized.

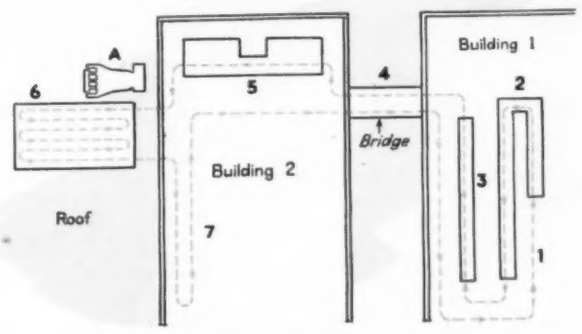
3. To achieve a hard-baked finish of uniformly high quality required the use of latest-type cleaning, spraying and baking equipment.

4. Rejects must be avoided as far as possible by proper selection of equipment, provision of well-designed conveyor racks and means to avoid contamination of workpieces by atmospheric dirt.

Continuous-flow production, wherein parts are put on a 1055-ft. chain conveyor and never leave it until inspected, was achieved by using the top floors of two buildings, separated by a street but connected by a 60-ft. bridge. These floors were only partially enclosed, the remainder of the area was roof. Hence the roof portions were strengthened and baking ovens built out upon them. Fortunately, it was also possible to concentrate the cleaning and bonderizing operations in one building in order to limit the area to which filtered air need be supplied for reasons of cleanliness in finishing. The complete layout of cleaning equipment, bonderizing, spraying and baking was engineered by Despatch Oven Company, under the direction of Anderson-Nichols & Company, engineering consultants.



PARTS REQUIRING SYNTHETIC ENAMEL are hung on a conveyor that traverses spray equipment, wherein proper preparation is secured by an emulsion-alkali cleaner, rinse and bonderizing



WORK FLOW FOR SYNTHETIC ENAMEL LINE

Station 1—Put workpieces in conveyor racks traveling at 9 to 12 fpm.

Station 2—Clean with combination emulsion-alkali cleaner (steel is not particularly dirty) and proceed into spray bonderize.

Station 3—Dry-off in Despatch oven maintained at 260 F. Oven air is heated by Ross oil-fired equipment with photocell flame control.

Station 4—Conveyor traverses bridge to second building. Fresh, filtered air maintained at 70 F. spills out of second building into bridge at 5 to 7% pressure differential to keep atmospheric dirt from entering spray room.

Station 5—Two Binks 20-ft. spray booths are arranged in tandem. In first, operator sprays interior of work, fog sprays the outer edges. After one minute dry on conveyor, work enters second spray booth for application of heavy coat to exterior.

Station 6—Despatch 6-pass oven bakes white synthetic enamel to hard finish. Make-up air is filtered, reducing rejects for dust on finish by 75% or more. First pass in oven brings work to temperature of 300-325 F.

Station 7—Inspection and unracking for storage.

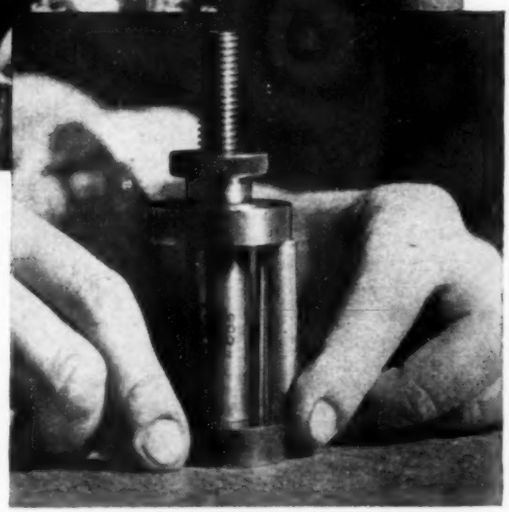
Item: A—Air conditioning equipment

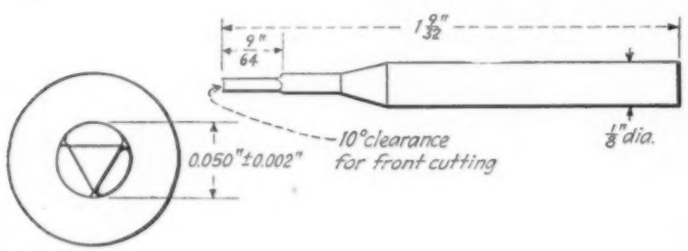
SHOP SHOTS

FROM EVERSHARP

Production short-cuts abound in the plant of Eversharp, Inc., which is geared to produce in the neighborhood of 50,000 fountain pens and a like number of mechanical pencils every 24 hr. Wherever possible, production operations have been simplified and made easier to perform. Precision has been built into the tools provided for each operation, so that training of operators can be accomplished quickly

HIGH-SPEED ROUTING—High-speed steel routing tools, 0.045 in. in dia., driven by two 5,000-rpm. air motors, cut two grooves inside each end of hard-rubber ink cartridges for the "CA" ball-point pen. The cartridge is held in a split collet mounted in the indexing work holder, shown in loading position. Swung into cutting position, two slides carrying the air motors are moved into the work against spring pressure by toggle linkage connected to a pedal under the bench. The index plate is rotated through 72°, cutting a groove on a 0.062-in. radius at each end. Slides are then returned and work is indexed another 72° to get a starting position for the second cut, during which the work rotates another 72°. Air cleaner and lubricator shown serves duplicate fixtures on opposite sides of the work bench





Enlarged End View

CHECKED ON PRODUCTION BASIS—Post-type gages, developed by Eversharp engineers and made from tool-steel sections and lengths of cold-drawn seamless-steel tubing, provide rapid checking of pen and pencil parts. A 1½-in. dia. bottom gage ring is fixed to a 7/16-in. stud and separated from a hardened and ground adjustable gage ring by a length of 21/32-in. O.D. steel tubing. The adjustable ring has a 0.010-in. step on one side and a 0.020-in. step on the other, diameter of each step being 1.0 in. Adjustable gage rings having steps of varying dimension on opposite faces are provided at low cost. Ends of separating tubes must be ground parallel and square with their axes

BUFFING MADE EASY—Simple hand tool makes it possible to polish three of these "Pyralin" plastic barrels and caps for pens and pencils at the same time, without extra effort by the operator. A board mounted in front of the buffing wheel provides a support on which the operator can rest arms while using this tool. Most of the operations are done by hand on 7-in. face, 12-in. dia. cloth wheels loaded with various fine polishing and buffing compounds suitable for plastics

ROUND AND ROUND THEY GO—A ferris-wheel type fixture with 12 work-holding spindles designed to hold conical brass points for machanical pencils speeds polishing and buffing. The operator loads the tips on the spindles with her right hand and removes them from the other side of the wheel with her left hand. A glove is required on the left hand because buffing heats the parts. The motor-driven gear reducer on which the work wheel is mounted is adjustably positioned in relation to the buffing wheel so adjustments can be made for variations in size of work and diameter of the buffing wheel

ONE OPERATOR, TWO LATHES — Bench lathes with diamond-pointed tools are used to line-burnish gold and gold-filled pen caps for a length of 1⅜ in. The 8-pitch leadscrews in each lathe are geared so the burnished helical line on each pen cap has a pitch of 48 lines per in. Spring-loaded mandrels hold the caps between centers so any enlargement of diameter in the cap is automatically compensated by spring expansion of the mandrel. The second lathe is mounted 5 in. above and 5½ in. behind the lower lathe, enabling the operator to work at one while the other is running

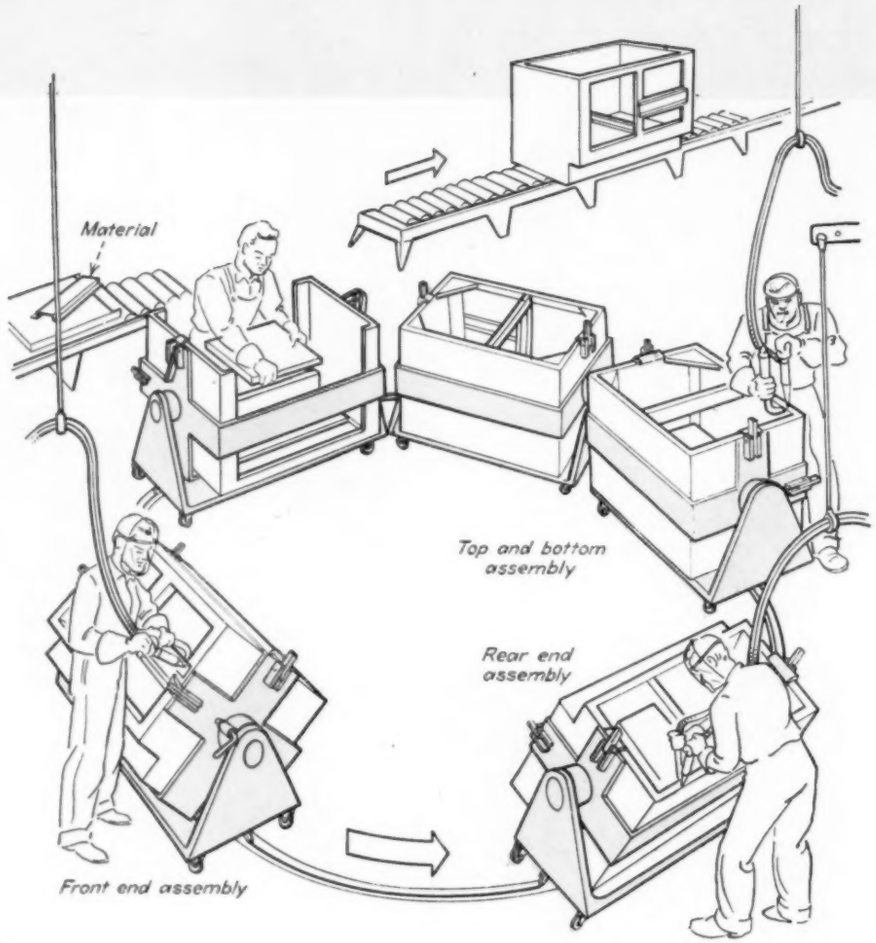
Fixtures Make Welders Flexible...3

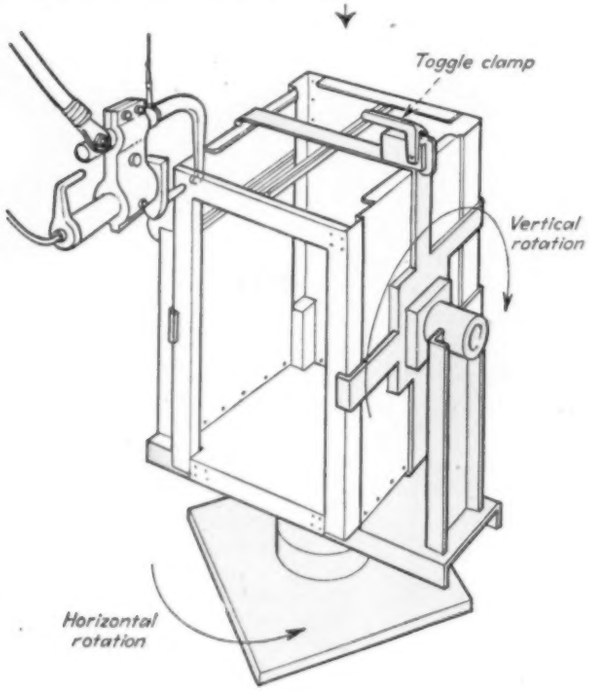
BY ED REILLY

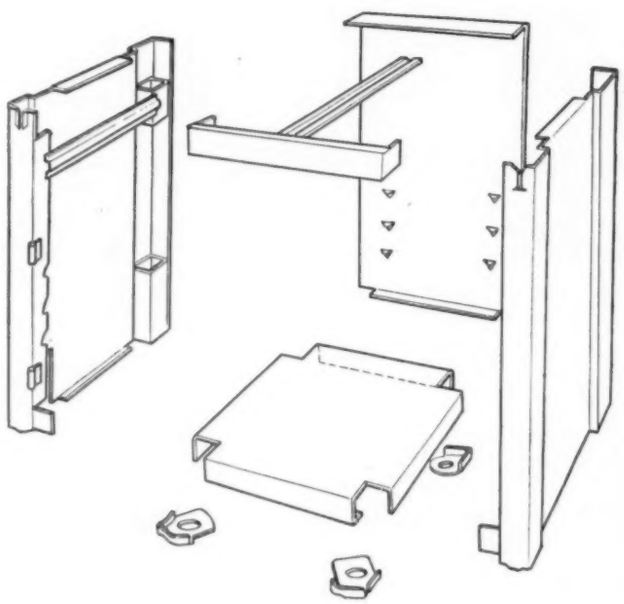
WELDING ENGINEER
SPECIALTY EQUIPMENT &
MACHINERY CORP.

ASSEMBLY WELDING—Rotary assembly jigs and standard gun welders put dishwasher cabinet assembly and fabrication on a production basis. Roller conveyors bring the material to the jigs and take the welded cabinet away. Components are held by toggle clamps and the jigs are light to facilitate positioning to desired working angles. Cast-iron cradles, mounted on rollers, carry the jigs around the assembly rail

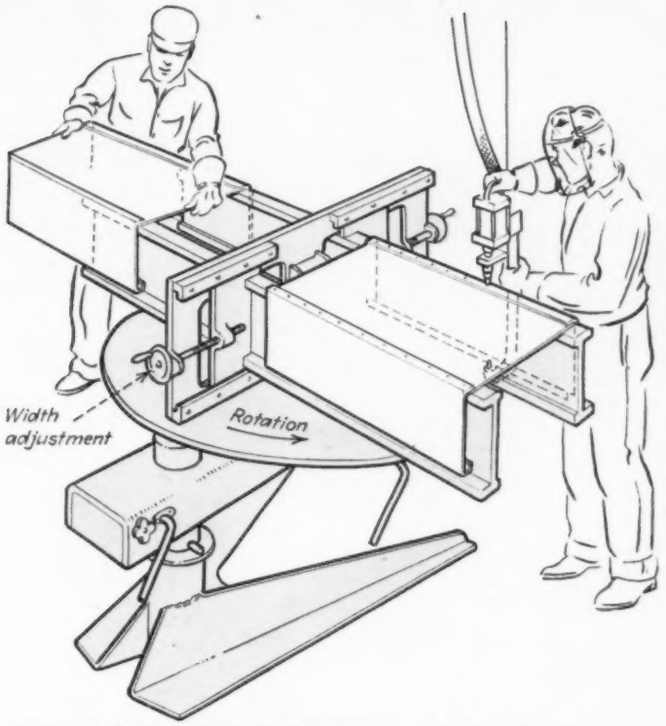
ROTATING FRAME ASSEMBLY—This type of cabinet can be readily assembled by gun welding with a jig that rotates both horizontally and vertically. The jig automatically locates the components and holds them in place with a toggle-clamp arrangement. Flexibility of this type of jig allows the operator to work at waist height with a minimum of fatigue



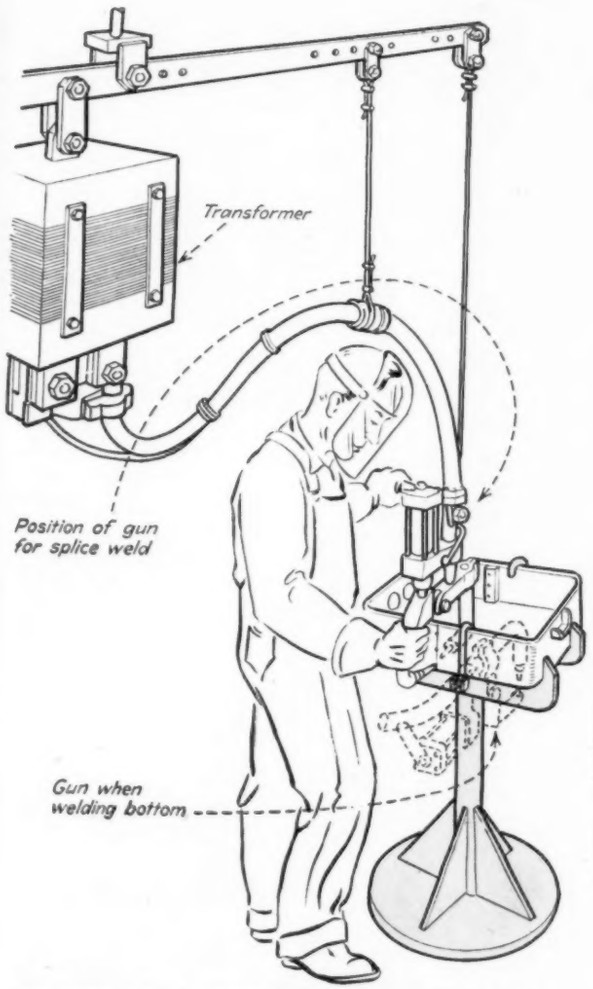




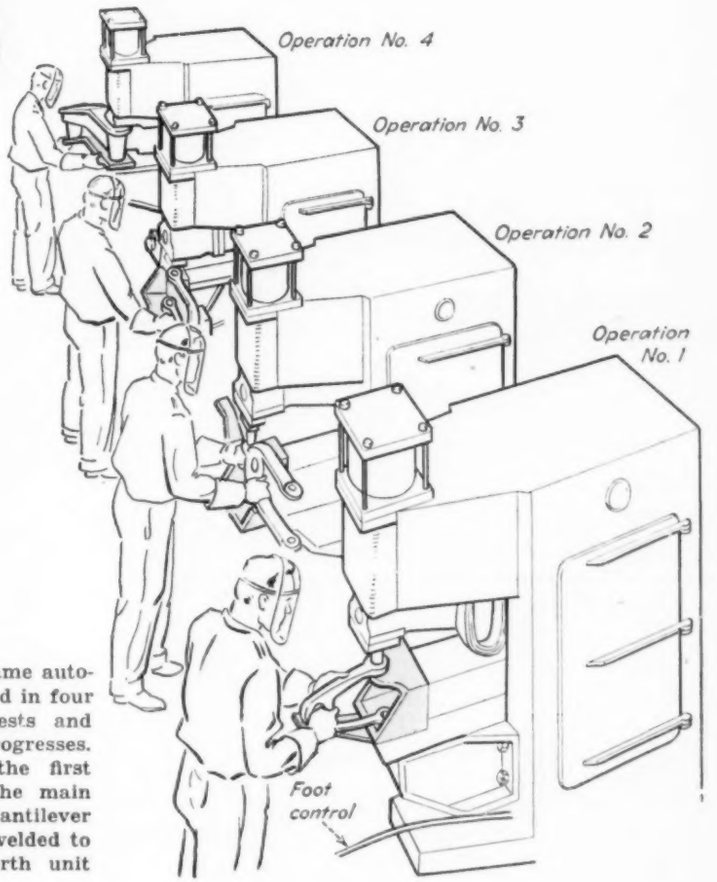
Loading devices, rotating fixtures and gun welders combine to speed fabrication of many commercial units. Last of a series of typical applications



CABINET ASSEMBLY WELDING—A rotating pedestal-type jig makes it possible to weld various widths of cabinets on the same jig. A handwheel adjusts location for the required width of cabinet and one operator loads the jig while the second operator is welding with a deep-throat gun welder

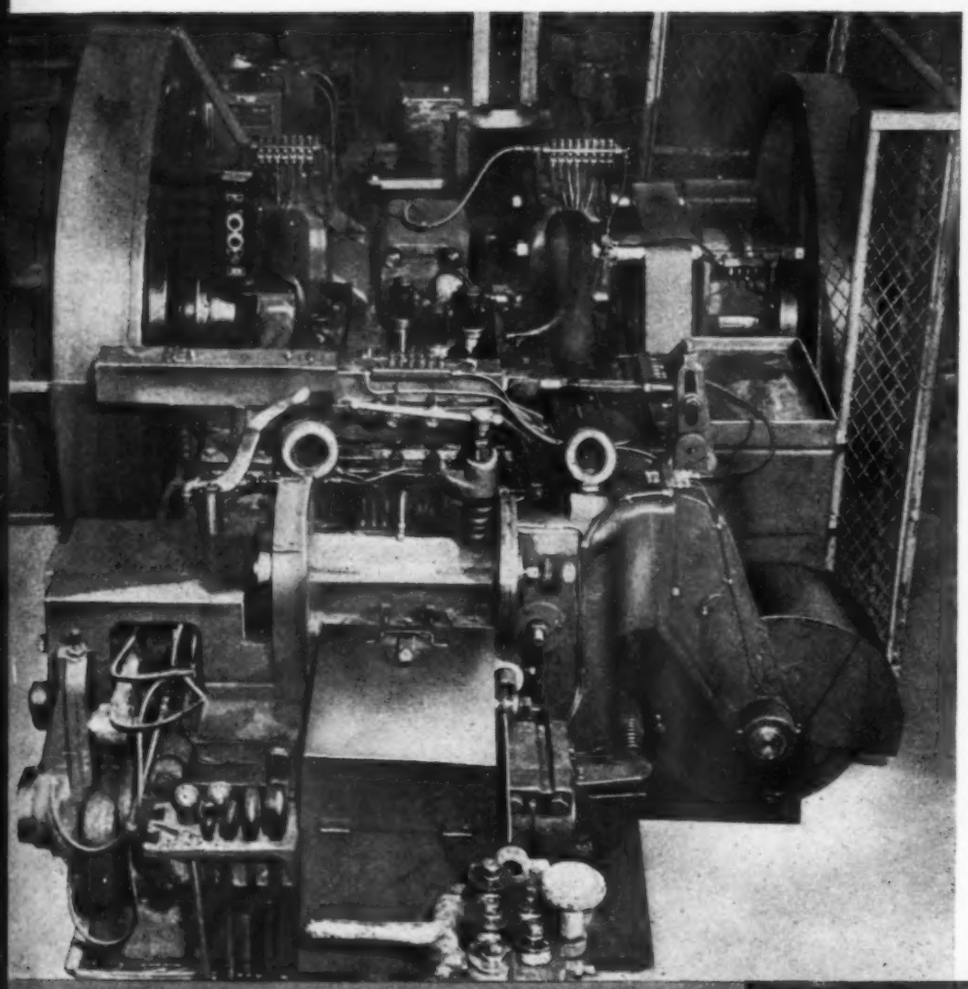


POCKET RACK ASSEMBLY—A rotating jig and fixture has speeded up production of pocket racks with gun welders. While the welder covers the length of the assembly, the opposite side of the fixture is loaded and later swung by hand into welding position. An I-beam and trolley helps the welders accommodate the length of this assembly



STRAIGHT-LINE WELDING—Front frame automotive cross-bar assemblies are fabricated in four projection welding operations, work rests and locating pads being varied as the piece progresses. The small cantilever is welded on the first machine, a connection is welded on the main cantilever in the second, ends of main cantilever arms in the third unit and the housing welded to the front frame cross bar in the fourth unit

Cold-Heading Makes Pull Rods Faster



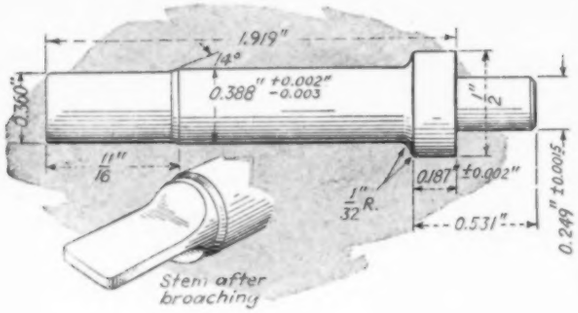
AC Spark Plug's need for cold-headed parts is increasing, hence this Waterbury-Farrel No. 3 progressive header (⅜-in. wire capacity) is being tooled up for several jobs besides pull rods

BY RUPERT LE GRAND
ASSOCIATE EDITOR

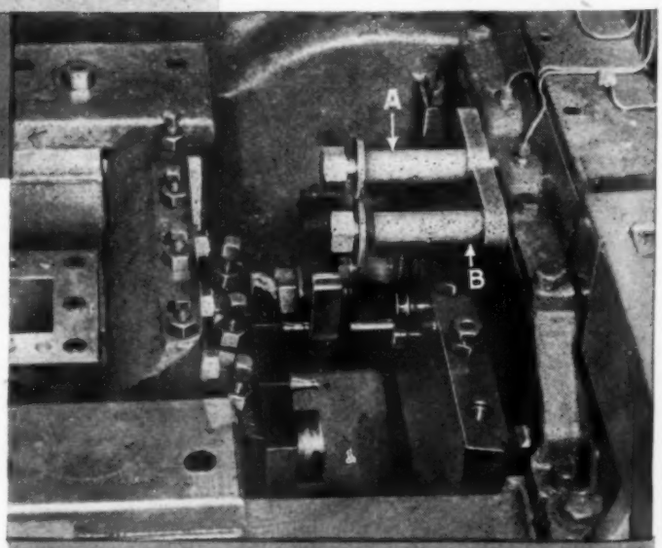
PULL RODS were formerly turned on screw machines at AC Spark Plug Division, General Motors Corporation, at the rate of 4.2 hr. per 1000 pcs. The same work is now performed by progressive heading at the rate of 0.2 hr. per 1000 pcs., or 21 times as fast. A further advantage is that the material, SAE 1017 steel, is workhardened at one end by extrusion; thus the difficulty of broaching a normally draggy steel is overcome.

Major diameter of the piece is controlled by the wire size, in this case 0.370 in. Unusual in heading is the production of the tenon in two operations.

The original tool layout called for tool steel inserts for the dies. In the case of extruding, tungsten carbide dies have proved superior, because the extrusion angle and land will not break down, and the wear resistance is such that several million pieces can be produced. And because certain grades of carbide will withstand impact, parts can be extruded and upset in one die. Experience shows that the extrusion angle per side can be from 10 to 14° and the land from 0.032 to 0.050 in. wide.



Cold heading produces a part to close tolerances and workhardens the metal. The latter assists broaching the stem (insert) in a later operation



Close-up of header tooling for pull rod, as seen from the operator's station. Transfer crankshafts *A* and *B* (with fingers not shown) advance the piece from stations 2 to 3 and stations 3 to 4, respectively

SEQUENCE OF HEADING OPERATIONS

Station No. 1

The wire is fed from the coil by intermittently rotating feed rolls, passing first through the frame and next through the cutoff die *10*. To insure a uniformly exact amount of wire projecting beyond the face of the cutoff die, the wire feeds against an adjustable feed stop. A cutoff blade with suitable springs (not shown) advances and severs the wire. This becomes the blank and is carried in the knife to alignment with the tools at Station No. 2.

Station No. 2

The wire blank is totally confined in the carbide insert 11 held within the die 12. The punch 13 advances with the gate and the rear end of the blank is partially extruded in the insert 11. The gate with the punch then recedes and at the proper time the knockout pin 14 ejects the blank from the insert 11 into the transfer fingers 15 which transfer the blank from Station No. 2 to No. 3.

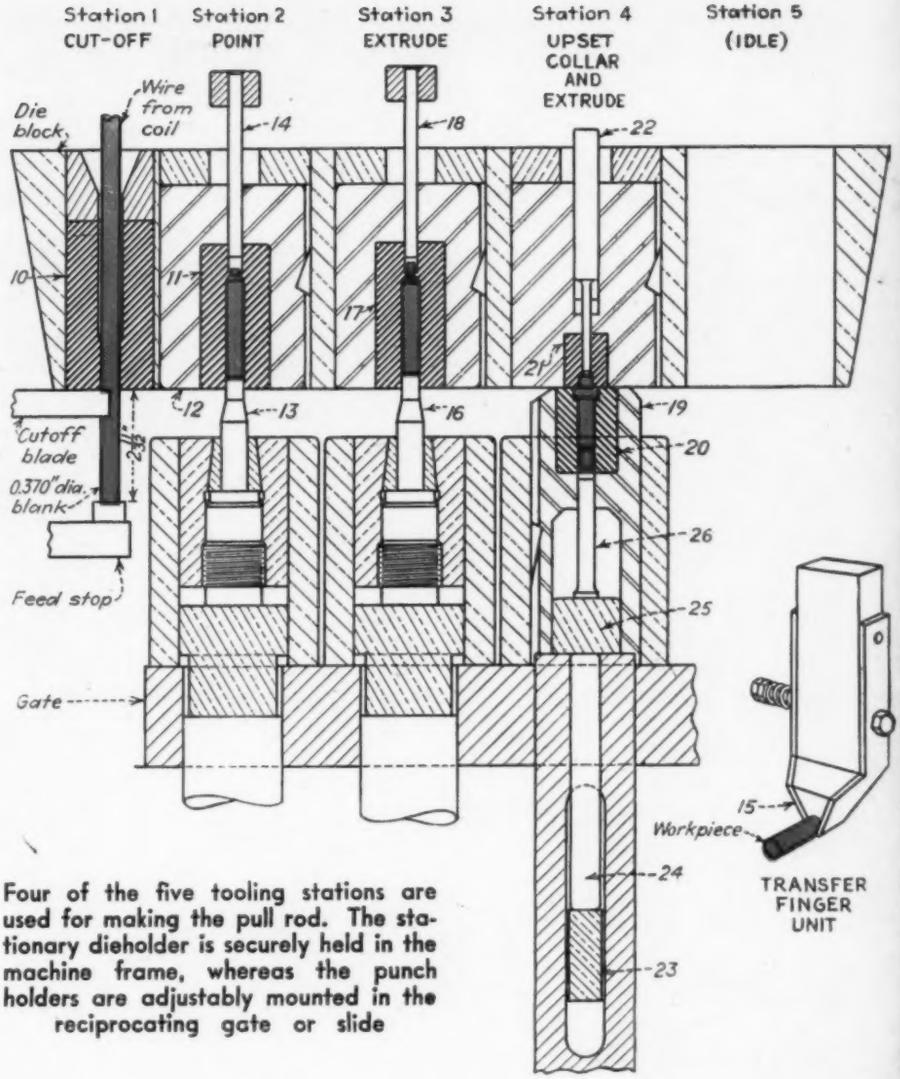
Station No. 3

The advancing punch 16 forces the blank into the carbide die insert 17. Being totally confined, the rear end of the piece is extruded to the correct diameter for the small tenon projecting beyond the collar of the finished blank. The punch 16 now recedes and at the proper time, the blank is ejected by the knockout pin 18 into a second set of transfer fingers 15, which transfer the blank from Station No. 3 to Station No. 4. These transfer fingers, and a similar set at Station 4, are attached to the transfer crankshafts *A* and *B* seen in the close-up photograph of the tooling. The crankshafts swing together through an arc of 180°, the total swing being the distance between centers of tooling steps.

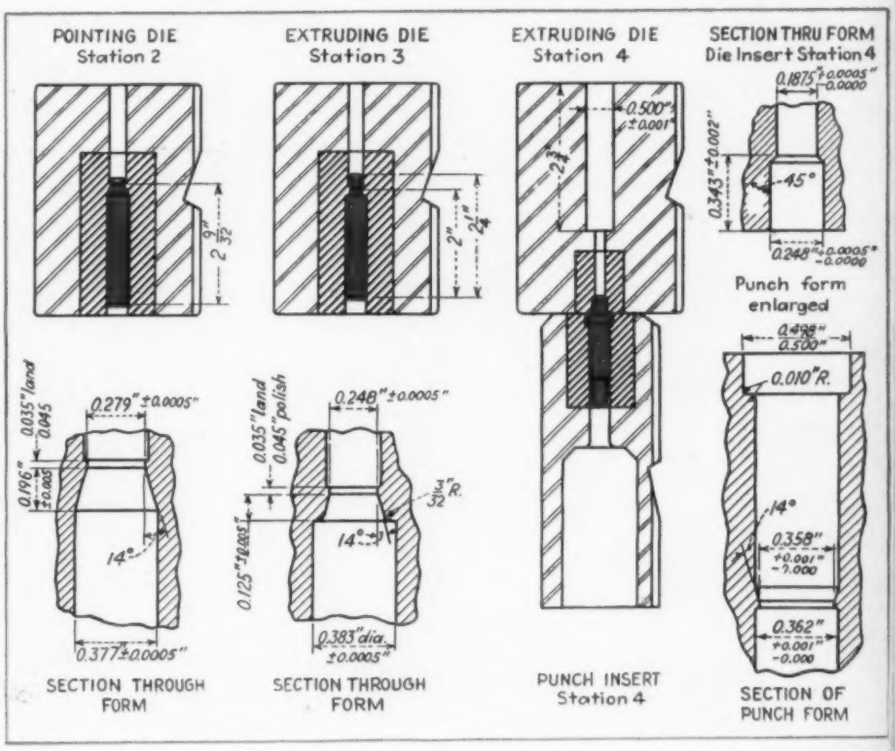
Station No. 4

Punch 19, with a carbide insert 20, as it advances, forces the small extruded end of the blank into the die insert 21. The bottom of the recess in the die insert produces a small chamfer on the end of the tenon. The punch insert 20 performs two functions: first, extrudes or reduces a portion of the blank to workharden the metal for broaching in a later operation and simultaneously upsets the collar. (Note: originally the extruded diameter was used for a rolled thread.)

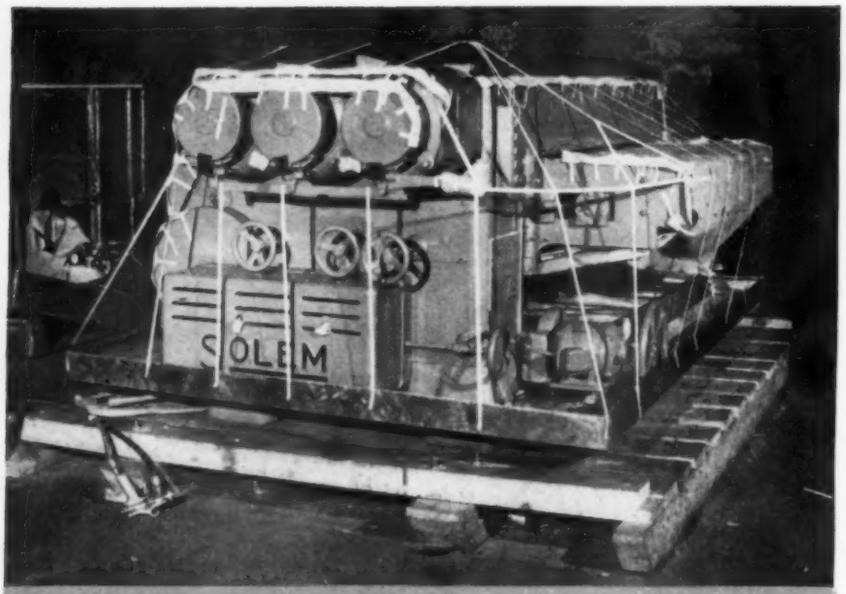
Now the piece is completed and withdraws with the punch 19. However, in case it should stay in the die 21, there is a knockout pin 22 which advances and insures freeing the die of any workpiece in the next cycle of the machine. When the gate returns to its rear position, a knockout lever 23 through the rod 24, plug 25 and pin 26, ejects the finished blank from the punch so it is empty, ready for the next cycle. After the machine has made three cycles, each station will be loaded and, therefore, a complete piece is made at each stroke of the gate at Station No. 4.



Four of the five tooling stations are used for making the pull rod. The stationary dieholder is securely held in the machine frame, whereas the punch holders are adjustably mounted in the reciprocating gate or slide



Man-Spun Cocoon Protects Shipments



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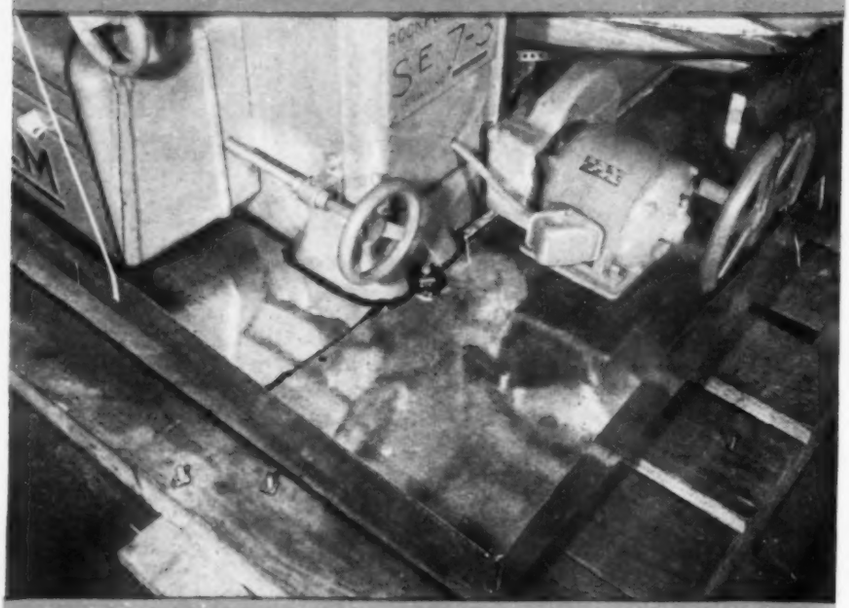

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3

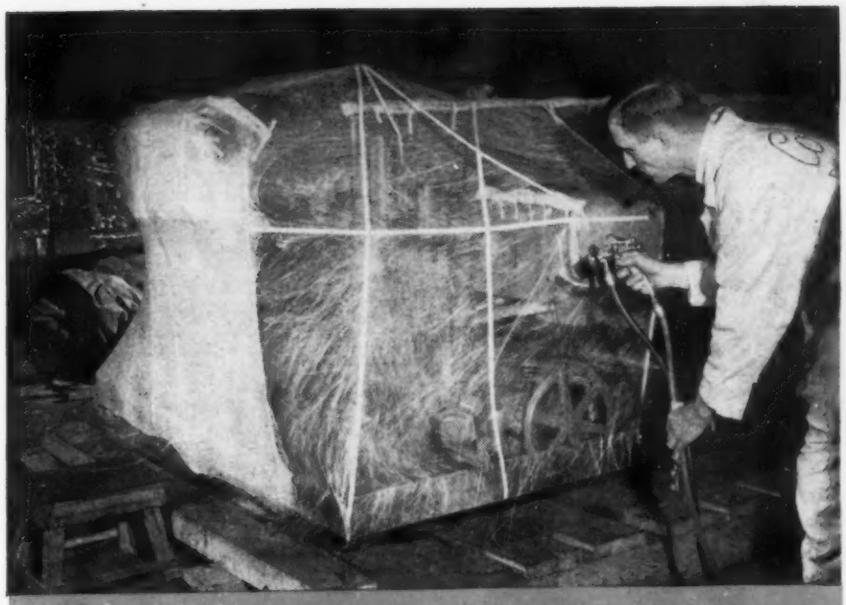
1 If the machine tool to be shipped is heavy or bulky, as in the case of this Solem 3-drum sander, the first step is to bolt it to a wooden skid. A sheet metal pan is provided as a terminal surface to which the solution is sealed. Sharp corners or projections are padded. Pressure-sensitive tape is then applied to the outer projections of the machine, both horizontally and vertically, to provide a grid with the minimum dimension approximately 20 in.

2 All seams, contours of the machine and bolt connections are caulked to exclude air or moisture. This platform is more complicated than usual because of the shape of the particular machine. The grinder at this point is equipped with operating lubricants, but does not require any rust preventive. When the equipment arrives at its destination, it will be ready for operation after conventional installation steps

3 Good distribution of taping, seen here, as the first spidery web of plastic solution floats into place, substantially reduces the amount of packaging required and gives a better contour. After the package is complete, this tape bears no load

4 Formation of the plastic web, applied with standard air spray guns, is well on its way to bridging the gaps left by the tape. None of the web passes through the grid and the coat need only be strong enough

NOW enroute to Brazil as a test shipment is a Solem 3-drum grinder, just packaged in Cocoon plastic at the plant of the Solem Machine Company, Rockford, Ill., by R. M. Hollingshead Corp., manufacturer of the liquid coating material. While this process has been approved by Army-Navy for storage of ordnance and much is being used for "laying up" planes, ships and their equipment, this is the first major commercial investigation by a machine-tool manufacturer. Process is pictured step-by-step



4

to withstand spraying of successive coats. Cobwebs are sprayed until a thin translucent film is formed

5

5 Air vents have been cut into the package just before the final spray, enabling any fumes or moisture to be drawn off. By coloring each application with a different dye, the operator can lay on a more uniform film. All solvent vapors are blown through the escape holes and packages of dessicants such as silica gel are distributed inside the package. Holes are patched by spraying around the edges, placing a patch of the dried plastic material over the hole, then spraying around its edges

6

6 The package is finished. Because it is destined for shipment and the storage period will be well under a year, an aluminum top coat has been applied. If longer storage is desirable a coat of Gilsonite-base material of good bonding properties should be applied. An aluminum spray will resist the sun. Behind the Vinylite window at the far end of the package is a humidity indicator. Tools required for removal of package—one fairly sharp knife.

SPRAY-COATING DATA

1. One gal. webbing solution covers 100 sq. ft. taped surface.
2. One gal. of coating solution covers 100 sq. ft. at a coating thickness of 4.25 mils.

Tensile Strength—1,750-2,000 psi.
Low-Temp. Flexibility—180° bend over 1/8-in. rod at —40 F.
High Temp. Resistance—Non-tacky at 180 F.
Chemical Resistance—Acids, alkalis, aliphatic hydrocarbons, oils, fats, greases, primary alcohols and salt spray.
Flame Resistance—Inflammable while spraying only.
Application Temperature—40 to 120 F.

Broaching Matches Golf Irons Within 1/16 Oz.

Modern machining methods and flexible tooling provide golf club manufacturers with better cost control and allow complete interchangeability between sets

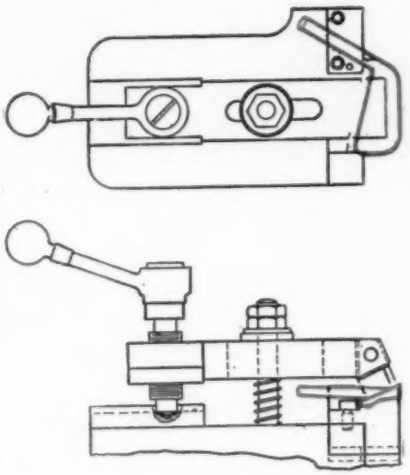
FOR THESE MANY YEARS, golfing irons have been essentially produced by grinding from forgings, a method which required many hours of highly skilled labor, plus forging dies for each model of iron. At McGregor Golf, Inc. of Cincinnati, complete sets of irons are now being produced by broaching, and precision of the club head as to shape and weight no longer rests entirely with the operator. Instead, these factors are controlled by the machine and the setting of the fixtures. Better control of costs is also achieved.

Three broaching operations are required for each head, and 84 an hour are turned out on a 10-ton, 66-in. stroke, Cincinnati vertical duplex broach. To accommodate these three operations on a 2-ram machine, it was necessary to have double stations at one of the rams. The flat on the back of the club head and a formed groove, also in the back, are both broached by the left-hand ram in adjacent stations, the groove being imparted by the right-hand station of this fixture.

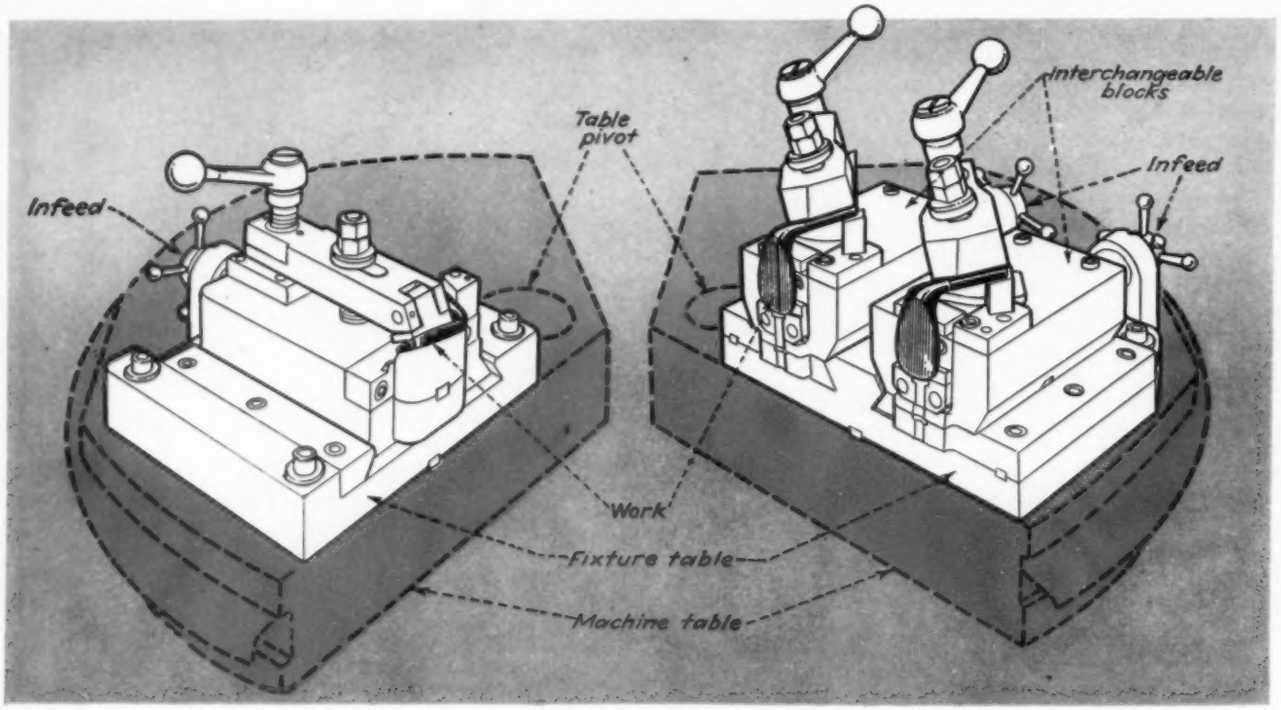
Each station in this fixture is individual and is arranged for infeed adjustment in order to provide weight control for the club head, the weight tolerance being plus or minus 1/16 of an ounce.

The machine is equipped with a pre-set control to give the operator control of the cycle of the machine. This is of particular importance on the left side of the machine, where the operator must remove and load two work stations and the time cycle must be greater.

This equipment handles Nos. 2, 3,

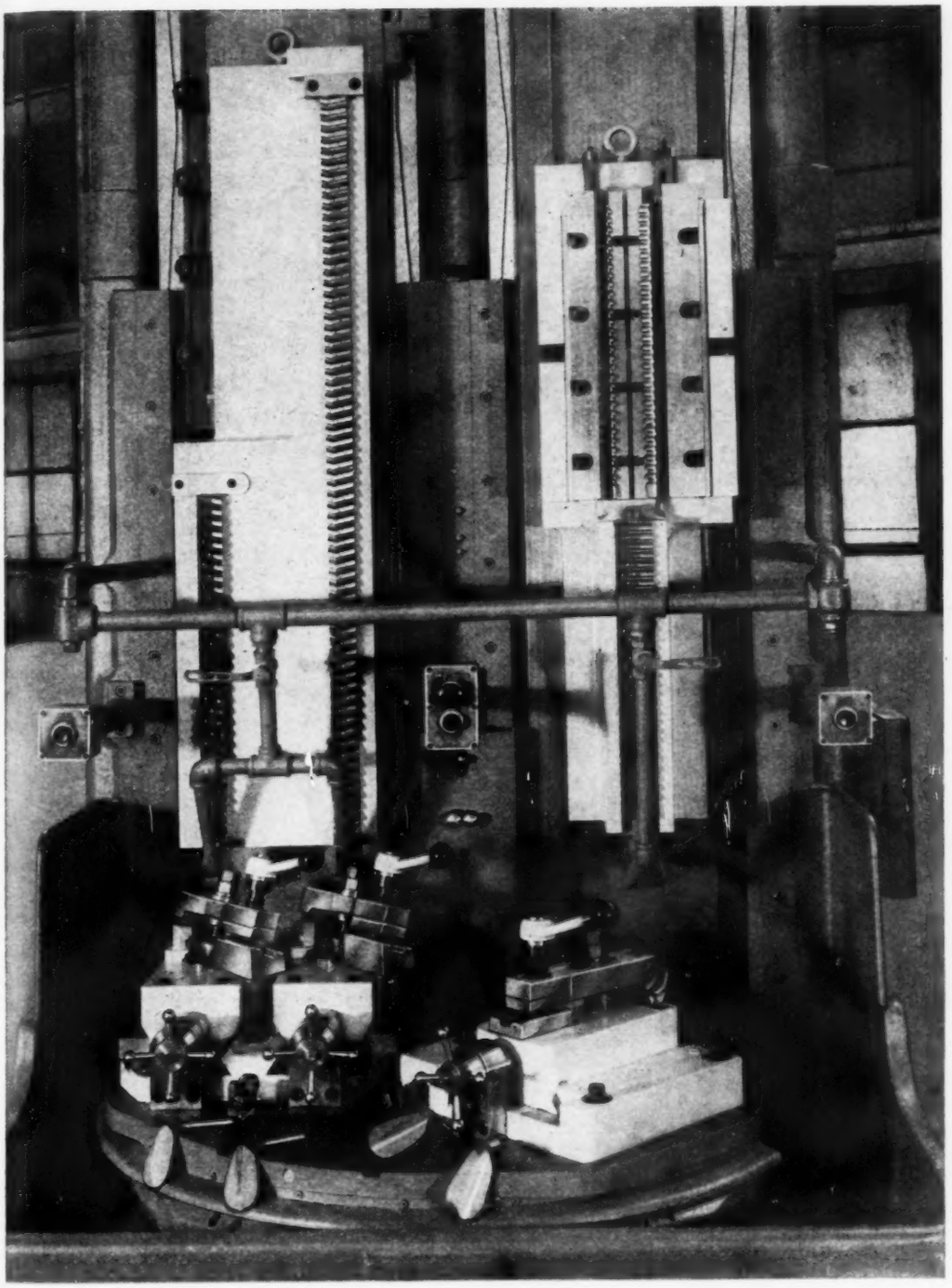


In the third position, separate locating blocks are used for each number of iron. Fixture details are shown



Here are details of the right-hand station in the broaching position with the work in the fixture. Cast-iron blocks are interchangeable in the base of the fixture and carry locating and clamping tools for each model of club. Infeed adjustment is available at stations for close weight control

Here the left-hand stations are in the operating position, with the finished work in place in each fixture. Two locating points can be seen, one on the broached back of the club and the other on the centerless-ground hosel. Three broaching inserts here blend sole, toe and heel



In the two stations at the left-hand ram of this Cincinnati vertical duplex broach the back of the club is broached and a groove imparted. The second ram has two broaching inserts for the one station, the top insert broaching the heel and toe and the bottom one forming the sole line. Sideways movement is provided in the top inserts. Preset buttons at left, center and right control the cycle and keep machine operation consistent with safety and operator skill

4, 5, 6, 7, 8 and 9 irons through all stations and it is necessary to change the locating and clamping details for each one of these numbers, in each work station. This is done by changing the entire upper part of the work station, which is a cast-iron block carrying the hardened locating and clamping details. These blocks are interchangeable and are completely set up for clamping to the table. The broach holder and broach insert are the same for all numbers of clubs.

The third operation broaching the sole line, toe and heel, is performed on the right-hand side of the machine. Separate locating blocks for Nos. 2 through 9 are provided. In this same station, three other heads, called pitching irons or special No. 7's, 8's and 9's having a slightly different angle on the sole than the standard 7, 8 and 9, are broached.

The wide row of tools in the lower part of the holder are concave tools for broaching the sole line, which is the bottom of the club head. In the upper half of the holder are two more rows of concave tools for broaching the toe and the heel. These two rows are held in an adjustable sub-plate which can be moved crosswise in order to give variation in the dimension between toe and heel surfaces.

Location of the part in the left-hand station is from the centerless-ground hosel and from the striking face of a club which has been previously disk-ground. In the right-hand station, location is from the previously broached back and the centerless-ground hosel. In this way, weight of the club can be accurately controlled without later grinding.

TALKING SHOP

Light Shows Fright

FOR BETTER WORKMANSHIP and employee comfort, the Cross Co., Detroit, has found 100 footcandles as the minimum satisfactory shop-lighting intensity. This has put a premium on keeping the shop clean. Floors are now scrubbed weekly to maintain this cleanliness standard. Cleaning and painting departments are equipped with downdraft ventilation so no dirt or fumes get into adjacent working areas.

Birth of Standards

A YEAR AGO, we pointed out that mass production of ships was developed 700 years ago in Venice—not six years ago in California. We've just learned that standardization was begun there and then too. Venice was a tremendous shipping center—an independent city with big opportunities for profit from supplying the Crusaders—if it could outfight rival Genoa. So Venice required its shipyards to begin building all vessels to standard measurements so they could be converted to warships at short notice. Further, ships could not be sold to outsiders and had to be kept in good condition.

Early Industrial Relations

ROBERT E. WOODRUFF, president of the Erie, explained recently a basic decision in industrial relations 95 years ago.

The first train over the N. Y. & Erie had "Poppy" Ayres, a jovial 300-lb. conductor. He rigged up a rope to the engine cab, so when he pulled the rope, a stick on its end jiggled. But Hamel, the engineer, wasn't taking orders from any conductor, so he cut the stick down. Poppy put it up again; Hamel cut it down. Finally, Poppy lost patience and beat the daylights out of the engineer, thus firmly establishing not only his own signal but setting the precedent which puts conductors in charge of American trains.

Subway Philosopher

HERE'S A TRANSCRIPT—as nearly as we can remember—of the remarks of a fellow subway rider the other day:

"Sure, I'm a good union man. I pay my dues, I go on strike, I get more money. But I'm beginning to wonder what it gets me. Last night it gets me a piece of meat for a buck twenty that we had 3 bites each out of. And the kids had small bites. It gets me a pair of five-buck shoes for nine bucks. It gets me more money, but look at the prices! I usta have a few bucks left at the end of the week, but I don't now. Boy, I'd sure be willing to have my old wages back if the darn prices would go down. And the sooner our union leaders and politicians realize it, the better."

Cooler Welding

JUST A FEW years ago, cooling spot-welder electrodes was news; next it was refrigerating the cooling water. Now G.M. is applying the findings of one welder manufacturer and recirculating the electrode coolant in a closed circuit system.

Ordinary tap water frequently contains impurities which settle out or are thrown out at the hottest point in the circuit—the tip of the electrode. Clogging results, allowing electrodes to overheat, distort and spoil costly assemblies.

Reusing the same water avoids these troubles. Impurities are deposited out in the first few passes. Water is cooled by spraying in roof tanks. Return temperatures are high—perhaps 105F. in summer, so refrigerating equipment is the next step—to cool water to 40 or 50 F.

The step after that is to make every welder a power engineer.

Peak Knocker

AMONG ORDERS one gas-turbine maker has are one for a 4,000-hp. gas-turbine locomotive burning coal as a fuel and another for a 10,000-kw. "peak knocker," a generating set to be used by a utility to take care of peak loads at a growing load center at the end of a transmission line. The latter will be cheaper than a new line.

Payments Now Received

CONTRARY to usual advice, one metal-working company has abandoned the second check for wage-adjustment payments to its men. Its advantage as an incentive was more than counterbalanced by the fact that too many workers held out the second check for their own private purposes. To keep families conscious of the direct relationship between adjustment payments and company earnings, a detailed statement is mailed monthly to each worker's home. Cheating the little woman is now too much trouble.

Skin Remover

TO TAKE heat-treating "skin" off hardened fuel-injection parts before grinding, one Massachusetts plant uses sand-blast, reports "enormous" savings in grinding-wheel costs.

Faster Heat

ONE NEW fabricating press being built in Cincinnati for Formica Insulation Company will have aluminum rather than steel platens. They are expected to transmit heat more rapidly, thereby cutting cycle time in processing laminated plastics.

What's Happening to

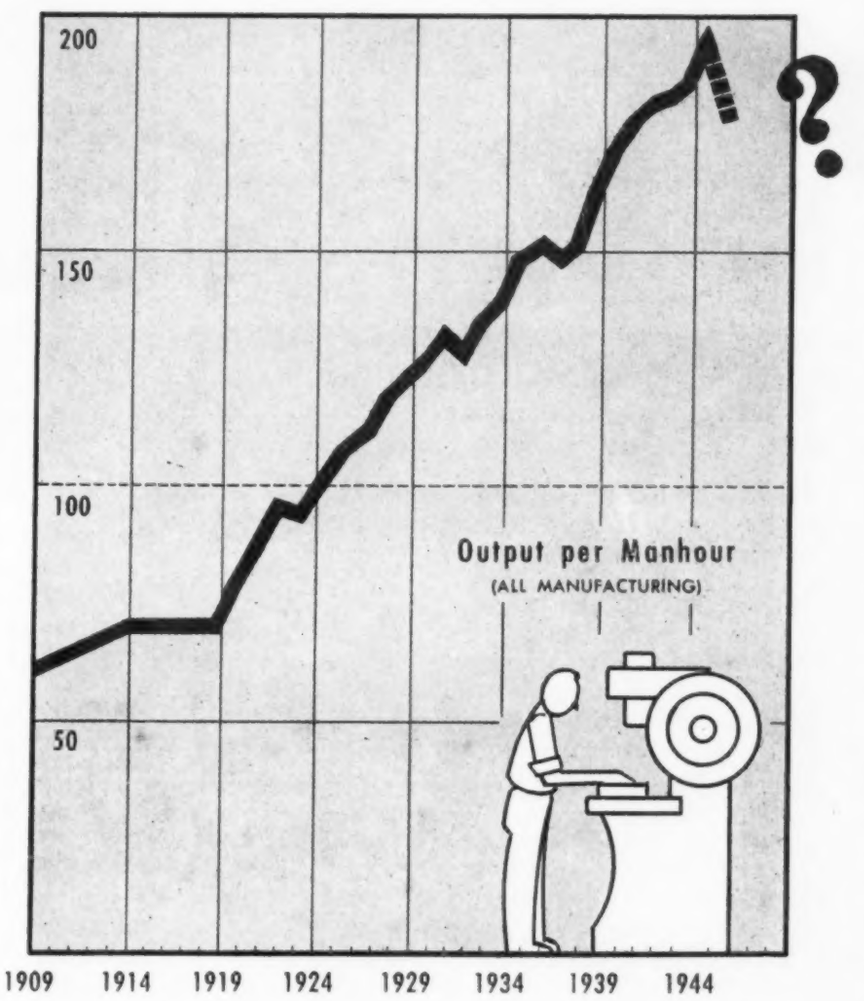
Productivity

STATUS . . . TREND . . . TREATMENT

Is labor producing more or less? What are the prospects for improvement? The methods? Here are an analysis, suggestions, and experience of eight companies

BY BURNHAM FINNEY

Editor, American Machinist



Source: Bureau of Labor Statistics

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

A DISTURBING decline in productivity in metalworking plants has been reported by many companies. The volume of production per manhour has not been what it was before the war. In some cases the slackening of output began during the war and has continued since. In other cases a decrease set in during the late 30's.

Both management and labor are in agreement that productivity has not been, and still is not, what it should be. General Motors and Ford, for example, have declared that productivity is far below the prewar level (20% less in General Motors and 34% less in Ford). The American Federation of Labor has said publicly that "free labor and free enterprise today must cooperate to increase productivity."

The area of disagreement begins when one tries to assess the responsibility for substandard productivity. Many employers bluntly say that the individual worker's unwillingness to do a day's work is partly to blame. Some union officials, on the other hand, vigorously dispute such charges. Richard T. Leonard, vice president of the United Automobile Workers of America, speaking recently before the American Management Association, made the sweeping statement that such charges are without foundation. He stoutly maintained that "the average worker at the machine or assembly line of the automobile industry today is producing at levels of individual efficiency equal to or above those before the war."

Just what is the situation regarding productivity? In an attempt to find the answer to this important question, *American Machinist* has consulted many industries in the metalworking field and many individual companies. It has examined whatever indices exist; and they are all too few.

Conclusions Reached:

1. That failure of productivity to get back to prewar standards cannot be attributed to a single cause.

2. It is difficult if not impossible to assay accurately how much the letdown in effort of the individual worker is to blame.

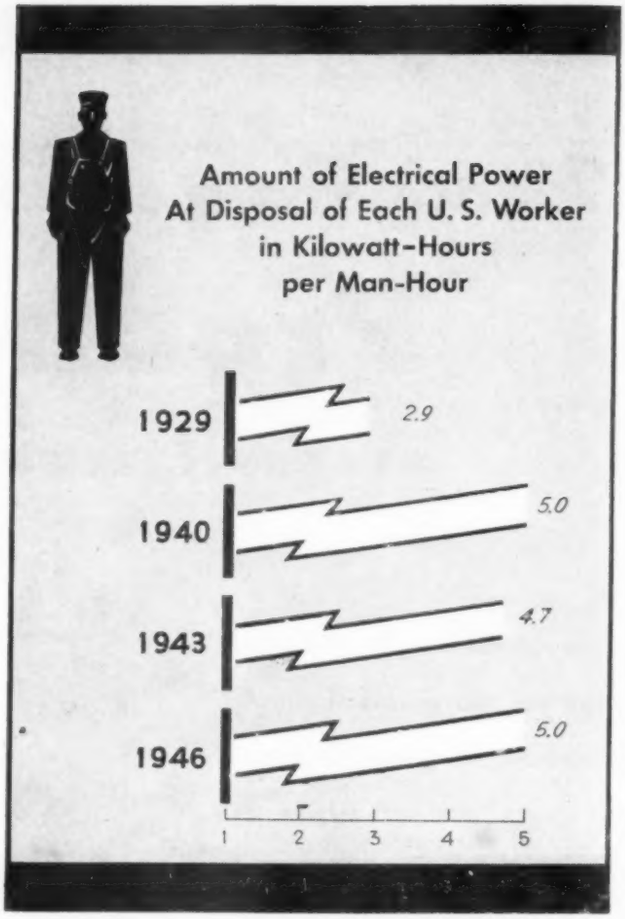
3. There is widespread belief in management circles, nevertheless, that part of the fault lies with the individual worker who seems less interested in "doing a job" than he used to be.

4. Evidence is accumulating to prove that workers in many cases have arbitrarily set a relatively low production pace beyond which they will not go. Unions have been behind this action.

5. Productivity of the individual worker is difficult to measure. Many companies have no method of measurement.

6. Some companies are using incentive plans to increase output per worker and are getting good results. But such plans are frowned upon by unions.

7. Productivity per man will rise in the near future (unless disastrous strikes interfere) as more materials and parts become available and hence as manufacturing operations become stabilized. This will be true even if physical effort per man employed remains stationary.



Source General Electric Co.

8. Many metalworking companies already have noted an upturn in productivity and are confident of a further rise. In a number of cases, these are companies which recently concluded protracted strikes.

9. If individual effort is not lifted higher than it is now, management will be forced to rely entirely upon greater mechanization and other means within its power to increase productivity.

10. Methods of measuring productivity are so poor and so lack in uniformity that one conference has already been called in Washington (sponsored by the U. S. Bureau of Labor Statistics and Budget Bureau's Statistical Standards Division and held Oct. 28-29, 1946) to study the subject. A permanent committee has been set up to continue the studies.

Productivity in all of American industry rose steadily over a long period of years. The increase began more than 100 years ago when mechanical tools and processes initially were put into the hands of workers, enabling them to turn out more with the same or less physical effort.

The gain continued with only minor interruptions up to the outbreak of World War II. Output per manhour gained in manufacturing industries at a rate of 3% to 3½% per year during the years 1909-1939, according to a study prepared by the Bureau of Labor Statistics, United States Department of Labor. From 1909 to 1916 productivity went up 16%, but stayed on a plateau during World War I.

From 1919 to 1929 a rise of nearly three-fourths was registered. A further increase of an additional one-third occurred in the ten-year period 1929-1939. The total gain for the 20-year term between the two wars was 125%. Only three times was the upward trend temporarily arrested—from 1922 to 1923, from 1931 to 1932, and from 1936 to 1937. The declines then were small.

The National Industrial Conference Board believes that four factors have been responsible for these phenomenal gains. First, better tools and machines have been put at the disposal of workers. Second, energies of capital and labor were coordinated more efficiently through better management and better production techniques. Third, a modern labor force, specially trained in mass production, has come into existence. Fourth, keen competition has stimulated industry to produce more efficiently in order to sell for less.

The productivity picture is clear up to 1939. After war broke out, it became foggy and obscure. New war products and changes in manufacturing practices made comparisons with past operations impossible and meaningless.

In certain non-essential civilian-goods industries, productivity declined during the war. The losses have been traced to a number of factors: lowered output, inability to secure new equipment, and the movement of skilled men, supervisors and managers into war industries. Not all of the non-munitions industries showed a loss. Some stayed stationary and some gained and then lost. So many uncertain factors were introduced because of war conditions, however, that the index figures compiled by the Bureau of Labor Statistics are not looked upon as being too accurate. The main point is that the prewar steady upward trend came to a halt.

In the strictly war industries, productivity went up greatly as "green" workers were trained to do their jobs, as mass-production methods were instituted for the first time, and as volume of output increased. Better performance was achieved despite many true reports of waste of manpower and despite numerous adverse happenings, such as high labor turnover and high absenteeism.

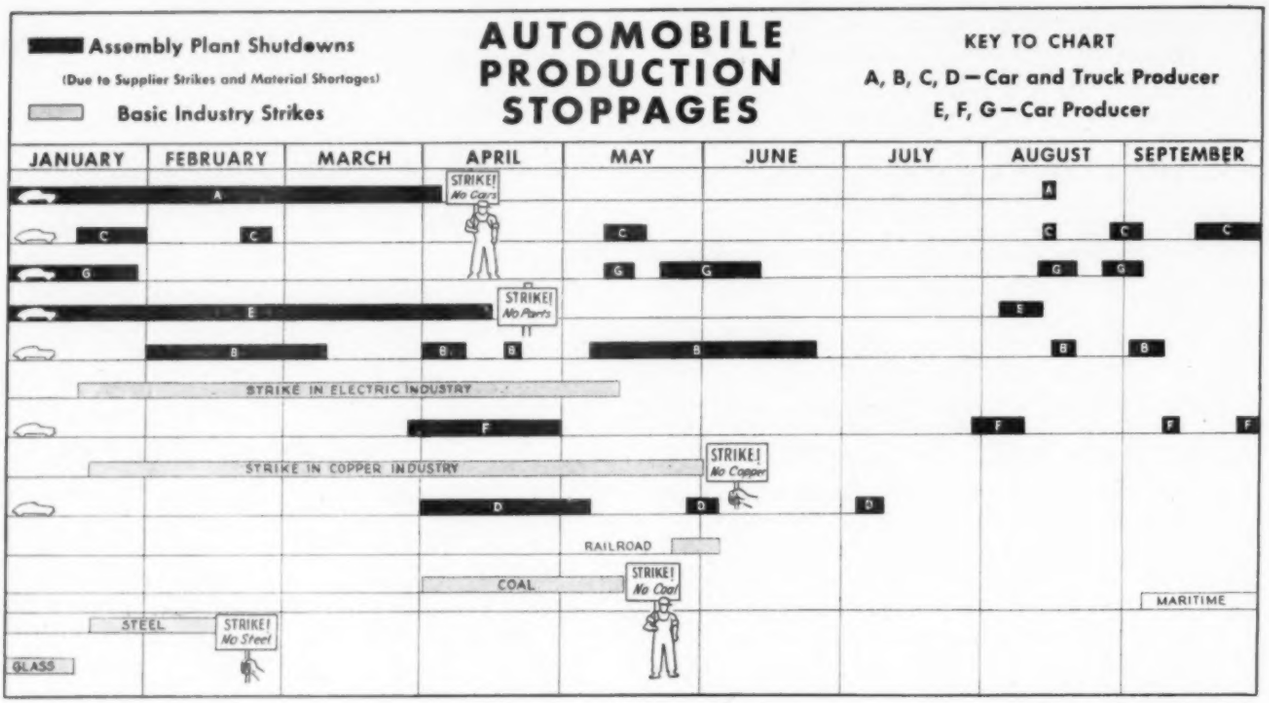
Take the airframe industry for example: The rise in productivity was made possible by a concentration of effort on standard designs produced in large volume. Output of airframes per manhour tripled during the three years following the Pearl Harbor attack, according to figures of the Bureau of Labor Statistics, Department of Labor.

As in the airframe industry, the shipbuilding industry made the best productivity record in the yards building large numbers of ships of uniform design. Average declines of 16% to 22% in the number of manhours required per ship accompanied each doubling of output in yards building Liberty ships, Victory ships, tankers and standard cargo vessels. The extent of the reduction in productivity differs

MEANS OF INCREASING PRODUCTIVITY
How Many Are You Using?
(CHECK THIS LIST)

- ☐ **1.** *Enlarged use of mechanical power.*
- ☐ **2.** *Development of processing machines toward automatons.*
- ☐ **3.** *Greater use of templates, jigs and fixtures to increase the speed and precision of worker efforts, and the uniformity of production results.*
- ☐ **4.** *Better design of product, involving simplification and elimination of uneconomic varieties.*
- ☐ **5.** *Grading of raw material.*
- ☐ **6.** *Greater use of electronics for reduction of effort.*
- ☐ **7.** *Improved organization of facilities and of movements of raw materials and finished products.*
- ☐ **8.** *Better handling equipment.*
- ☐ **9.** *Stimulation of greater personal performance by subdivision of labor, by assignments more nearly in line with natural aptitudes, and by more equitable grading of occupations through job analysis.*
- ☐ **10.** *Training workers in superior methods of manipulation.*
- ☐ **11.** *Consideration of plant conditions to provide maximum physiological welfare of workers, and use of other known methods of improving worker morale.*
- ☐ **12.** *Employment of more non-productive workers to study ways to accelerate the growth of productivity of so-called productive workers.*
- ☐ **13.** *Use of research, and more research.*

—John D. Gill, economist and director Atlantic Refining Co., at meeting of American Management Association, Nov. 14, 1946.



Source: Automobile Facts

materially between individual yards, reflecting variations in management ability and many other factors.

Now that the war is almost 18 months behind us, officials of the Bureau of Labor Statistics are predicting that productivity will rise abruptly in the next few years. Not only will the normal increase of 3% a year be resumed, but also a more than normal "jump" will make up for the lag during the war years.

They base their forecast upon Department of Commerce studies showing extraordinarily large investments in new equipment since the end of the war. Most of this equipment will have a definite superiority to that in use before the war. The present rate of investment in new plant equipment of all kinds, state Bureau officials, is three times as high as in 1939 and substantially larger than in 1941. The biggest increases are in industries not able to add much new machinery during the war and in industries which have had a reconversion problem, such as the automobile, electrical equipment, textile and machinery industries.

Worker Productivity Significant

In arriving at their conclusions, the Bureau of Labor people admit that *efficiency of the individual worker is not thought to be the most significant factor in ups and downs of productivity. They claim that production methods and the quality and efficiency of machines are the most important elements.* This conclusion is concurred in by other agencies familiar with the problem. Nevertheless, the human factor is of considerable significance, particularly when workmen can control the output of individual machines by refusal to produce over a given amount.

While the predictions about expanding productivity are likely to come true, results thus far are disappointing. In fact, in the automobile industry, the nation's biggest mass-production industry, the failure of productivity to rise antedates the war.

"The lag in manhour output in the automobile industry since 1936 is a dangerous threat to our national economy," declared George Romney, general manager of the Automobile Manufacturers Association, recently. "This lag, despite continued improvements in tooling and production methods, is contrary to the historical accomplishments by which the industry became the world's primary source of motor vehicles.

"A basic fact ignored in the current slide-rule wage forecasts is that prices cannot be reduced nor wages raised without improved production efficiency resulting from better methods and more output per manhour which reduce manufacturing costs. The growth of the automobile industry was based on constant increases in manhour output, made possible with less worker effort due to better tools and production methods. Constant improvement in production efficiency constantly lowered production costs."

To illustrate what has happened in the automotive industry, one General Motors plant can be cited which before the war made subassemblies used on all G.M. cars and on cars of other manufacturers. After operations had got into full civilian-production swing, a comparison of output per 1,000 productive worker hours was made on six items:

Product	*Compared with Dec., 1941*
A	67%
B	61%
C	71%
D	63%
E	71%
F	47%
Weighted Average	63%

In one automobile factory a group of workers were inspecting and repairing 110 radiators a day in 1941. This total was standard for the job. In 1946 it was found that only 65 to 75 a day were being done. Tests were run to decide whether the work-load was greater. It was found that it wasn't. Through threats of disciplinary action, the standard was brought back up to almost 110 a day.

At another automotive plant the union and management agreed to go off piecework if the union would permit maintenance of 1941 standards. This was done. A month later the manhours required per thousand units had increased by 35%, showing the damaging effect upon productivity of resort only to an hourly wage rate minus incentives.

Mr. Leonard of the United Automobile Workers of America, whose views have already been quoted, absolves workers from any blame for lowered productivity. He charges that where comparisons are made in departments which have the same equipment as before the war, output will be lower because "any machine which has operated over a six-year period tends to lose its efficiency and reliability even when the best and most ample maintenance work is available." He went on to say that "any decline in productivity is more attributable to deteriorated equipment than to declining labor efforts."

The subnormal productivity of which many managements complain is traceable to many causes:

1. "War weariness" was a natural reaction of workers after a long period during which the government and management were pounding them for maximum results and during which relatively long hours and a minimum of vacations prevailed. However, almost all observers agree that the "war-weariness" period should have ended long ago. It is no longer a legitimate excuse for poor performance.

2. Reconversion from war to peace disrupted many production setups. It put many operations on a temporary basis and slowed up operations while manufacturing operations were getting under way again. In that period productivity naturally would suffer. But that period is at an end for most companies.

3. Productivity increases rapidly when production itself becomes stabilized at a relatively high level. The strikes and other disruptions to the flow of materials and parts, such as price control, made irregular operations a necessity for many companies. During a time when production is up and down, when plants are running one day and are idle the next, a good productivity record obviously is impossible.

4. Many metalworking companies have an abnormally large percentage of inexperienced workers. These people do not possess the skill that most of the prewar workers had. This situation is being corrected as these workers are trained and as skilled prewar help returns to the old job.

5. Some men think that they should not work as hard now as before the war. They believe that industry can improve output without their exerting any

• FOUR WAYS TO INCREASE PRODUCTIVITY •

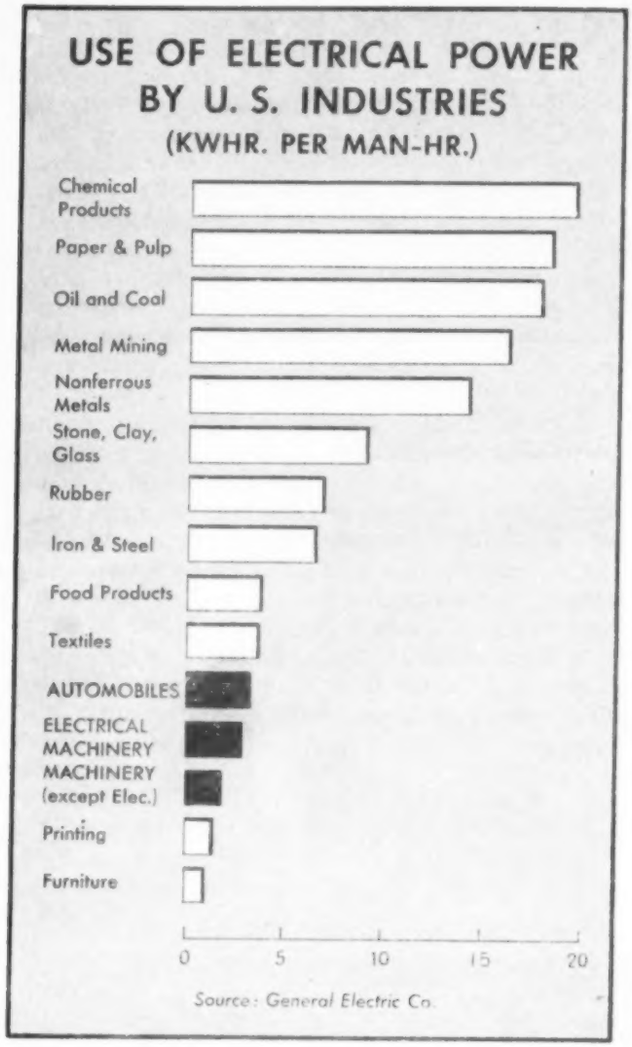
ONE of the country's important metalworking manufacturers believes that wage levels will not be reduced, hence the big problem is to increase productivity. It expects to get higher output per manhour by intensifying its efforts in four interrelated and interdependent fields:

ORGANIZATION—Disposition of facilities, personnel and responsibility to bring to bear maximum pressure on individuals for successful operation, thus to develop the maximum capabilities for leadership. This will result in more effective control of production and costs.

STANDARDIZATION—Reduction to a minimum, consistent with high quality and customer service, of minor variations in product design. Standardization will mean increased productivity by permitting longer runs with a given set-up, will make practicable further mechanization, will reduce inventories of raw materials, work in process and finished goods, and will in large measure simplify the clerical job of doing business. The company's engineers and salesmen are asked to work with the management and with customers to make studies to facilitate standardization. As a result of these studies, for example, the number of types of one product have been reduced from 236 to 32.

MECHANIZATION— This is the third and very important element which grows naturally out of standardization. The increased cost per hour of labor demands the review of all existing methods and equipment and justifies increased mechanization now where it was not justified before. All elements of the manufacturing job—buildings, machinery, equipment, processes, and materials flow—are reviewed in the light of current requirements.

EDUCATION—Possibly the most essential and yet the most intangible phase of the job is education. In the final analysis, the attainment of management's goal and the successful performance of the manufacturing job depend upon having an informed and willing work fence led by supervisors who have human understanding, are well informed and are capable of inspiring the respect and confidence of each of the workers supervised. The management is intensifying educational activities at all levels and in all subjects pertinent to accomplishment of its goal. It also recognizes that the attitude and therefore the effectiveness of its employees is conditioned in great measure by the attitude of the community. The educational program hence includes a broader public relations program.



more personal effort than they have been doing recently.

6. The high "quit rate" of workers adversely affects productivity.

7. Absenteeism continues much greater than the normal rate. In many companies it is two or three times what it should be. Constant substitution of temporary employees for permanent employees reduces productive efficiency.

8. Many workers are not interested in their jobs. They go through the motions of working and do the minimum required, but beyond that do not exert themselves.

9. The fear of losing one's job has not existed the past year for the simple reason that there have been more jobs than people to take them. Unless a worker flagrantly loafed or violated all the rules, he was reasonably sure of holding his job. The effect upon the less conscientious workers was to "take it a little easy." Productivity suffered as a result.

10. Poor organization and tooling incident to less experienced supervision and non-productive help has brought about a loss of productivity.

On top of the reasons just listed, union officials suggest two other factors which hamper productivity. One is the disparity between workers' incomes and the high cost of living, which has created a morale problem. Employees are resentful of this disparity and are not in a frame of mind to do their best. The other factor is management's attitude. Workers cannot be denounced one day as saboteurs of production and the next day be expected to give wholehearted cooperation in increasing productivity.

One of the deplorable practices which has crept into certain industries is that of limiting output to an amount considerably below the capabilities of the workers themselves and the capacities of the machines. Unions are accused of instigating such practices. If a machine can turn out 60 units an hour, the union tells the operator to cut it down to 40 or 45. Innumerable stories are told by management of new workers who have come into shops and produced far more than other employees only to be warned by union officials "not to work so hard."

While these practices are not general throughout the metalworking industries, they occur often enough and in enough places to comprise a real curb upon productivity. Management finds it hard to take effective action to put a stop to such practices. Main hope lies in education of union officials that artificial restrictions, in the long run, are harmful to the rank and file of their own members.

Improvement Anticipated

Despite the relatively discouraging results since V-J Day, productivity seems likely to mend in the months ahead. Upon this point both management and labor representatives agree, as do government officials. The historic upward trend in productivity is likely to be resumed and perhaps may rise fast enough in the next five years to make up for the lag during the war years.

"Productivity in 24 civilian-goods industries was about 15% below normal in 1944 because of failure to make gains during the war," said Andrew T. Court of General Motors Corporation, at a recent National Industrial Conference Board session. "A 30% gain in productivity from the present to 1950 would just about bring the nation back to a normal trend. In other words, American industry must gain 6% or 7% a year for the next four years even to get back to normal in 1950. It is going to take hard work and the cooperation of everybody."

Much of the betterment, according to testimony by metalworking firms, will come from better plant equipment, better management practices and stabilized operations stemming from uninterrupted flow of materials and parts. But the human element will contribute importantly too. Less turnover, less absenteeism and the advantages of an experienced working force will help to boost productivity.

Not the least of the trump cards in industry's hands is that of incentive payment plans which reward workers with bigger pay checks for turning out more work. Companies instituting such plans report very good results.

There is no gainsaying the fact, however, that efforts to increase the individual worker's contribution to productivity will meet with opposition here

and there. Again to quote Mr. Leonard, who speaks authoritatively for the powerful and aggressive Automobile Workers Union of America: "The UAW does not accept or support any attempt to increase productivity through intensification of the already adequate physical effort by workers employed in UAW plants. We are convinced, in general, that the average automobile worker has been giving more than adequate physical effort on his job. We are solidly opposed to any attempt by management to increase the physical demands upon the average worker. Only where it can be established that particular workers have failed to meet objective fair standards of effort will the union recognize management's right to demand more."

Mr. Leonard further stated that opposition to incentive plans is widespread and will not change in the foreseeable future. "Workers who succeeded in increasing their productivity under incentive plans," stated Mr. Leonard, "find that such achievement has been rewarded by a retiming of their job and a proportionate reduction in rate." Management will vigorously deny the truth of Mr. Leonard's charges; nevertheless this is the union's official position to which it is committed.

Henry Ford II sums up ably the problem of productivity facing the metalworking industries by saying that it is two-fold. Management has the responsibility for increasing productivity of machines by fostering research and development of new engineering and manufacturing techniques. At the same time management and labor have the problem of human relations: how to get more work from the individual employee.

Increased wage rates, combined with a productivity rate which stays on a level or declines instead of rising, inevitably spell higher prices for the goods produced. The only chance which industry has of absorbing new and higher wage rates is to squeeze out a solid gain in productivity. That has not been possible because of the factors outlined in this report, hence the manufacturer's only recourse is to higher prices for his product.

"It is fundamentally necessary to convince labor that it will benefit, perhaps more than anyone else, from increased productivity," said Albert Ramond, president, Albert Ramond and Associates, Inc., speaking before the American Management Association. "It is the relationship between wages and prices rather than the dollars take-home pay that regulates material comforts. It is equally necessary to show that increased productivity is the most sound, most permanent and most effective means of improving this relationship."

What Has Happened to Productivity in Six Typical Metalworking Companies

Company A

Employees . . . 2,300

OPERATIONS on new postwar products are being carried out on machines for which no productivity standards have yet been set. In the manufacture of the company's regular line of goods, there are some standards to go by.

Where standards are established, workers are operating at 95%, but in the other sections of the plant, productivity is estimated at 70% to 75%.

The relatively poor productivity rates are attributed to two factors: (1) Shop workers are not trying as hard as they used to and are not as earnest about their jobs. (2) Workmen are not of the same high grade as before the war.

Old-time employees may be trying as hard as ever, but since they are getting up in years, they aren't able to turn out the same volume of work as formerly. The newer men, most of whom are ex-G.I.'s, are not as efficient or as well-trained to start with as the older men. Moreover, they have a less conscientious concept of the job than men who spent years learning their trade and who have pride in craftsmanship.

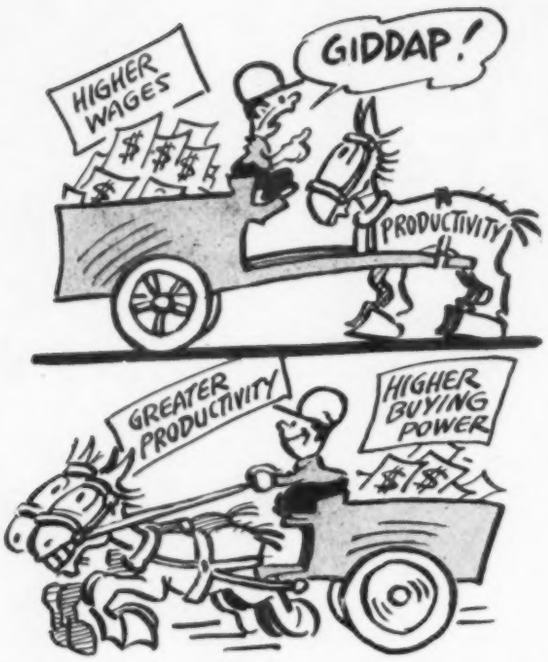
Employees working on the company's new products are paid on a daywork basis and, as a whole, have "stringing out a job" worked down to a fine art. As soon as work standards can be developed, the management feels that conditions will change for the better. No improvement is anticipated in the sections of the plant now running at 95%.

Company B

Employees . . . 8,000

PRODUCTION is constantly improving, though there is no means of measuring productivity in many departments. In those departments which have standards, output is more than prewar on a manhour basis. No incentive system is currently in use.

At war's end, the company was in a mess. Peacetime production lines had to be reestablished, a new company setup was installed, machines were shifted from one plant to another, and most of the past year the company was in the red. Sharp improvement toward the close of 1946 is believed due to elimination of most shortages of materials and component parts and to the excellent attitude of employees toward



To raise wages without increasing production is to put the cart before the horse. The time-tested method of increasing purchasing power is to expand production and drive down unit costs. *Source: U.S. Steel News*

the company and proper performance of their jobs.

"We certainly are not displeased with our productivity," said a company official. "We believe that it will improve further as we obtain sufficient supplies for a normal inventory."

This company's employees are not members of a national union.

Company C — Employees . . . 1,200

THE COMPANY feels that it is getting 100% productivity from employees as a result of an incentive plan based on time study for each shop operation. A considerable number of employees add as much as 20% to their base pay, and output per man is ahead of the prewar level.

Management is of the opinion that without the incentive plan production would decline, but officials would not hazard a guess of how much. Company is running on a strict 40-hr.-a-week schedule.

Company D — Employees . . . 2,300

WITH wartime production taken as 100%, and with no bonus now in effect as it was during the war, productivity today will match that of war days. Workers are on a 40-hr. week with hourly rates at the same level as during the war. The result is considerably less take-home pay.

Materials shortages have held back operations, but workers are not recalled to jobs until ample supplies are at hand to insure steady employment. Men called back on a seniority basis know that they will have regular employment, and once on the job again they produced at the same rate as in wartime.

A profit-sharing plan has been set up with 15% of a worker's annual wage going into a fund not to be disturbed or distributed for 10 years. The extra 15% comes from the company's earnings.

Company E — Employees . . . 2,000

PRODUCTIVITY is rising, having come up recently to 90% (prewar equals 100%) from a stationary 85% which had been maintained since the end of the war. The reasons for the improvement are: 1) intelligent leadership and proper supervision by foremen; 2) proper appreciation of their jobs by employees; 3) realization by employees that all terms and conditions of the union labor contract will be lived up to by the company (management insists upon equal treatment by the union); and 4) an incentive plan based on time study. The management does not give too much credit to the incentive plan, stressing more strongly the three other factors.

The company emphasizes the fine relationship between it and the foremen. In all labor negotiations, foremen are represented by a committee of three, chosen by all the foremen, to sit on management's side of the table. Not a move is made concerning company policy or procedure until after the foremen are consulted. All foremen are paid a bonus on the company's daily billings.

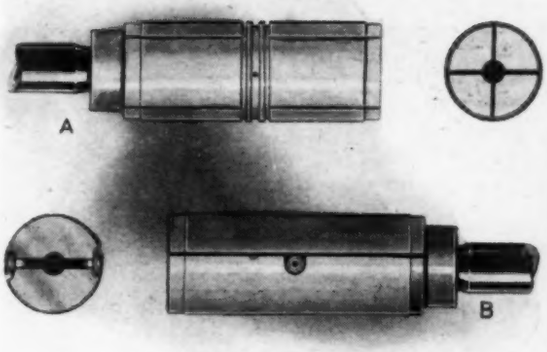
Company feels that soon it will get 100% productivity from its men. Increased friendly relations between plant workers and management are credited with much of the success for increased productivity. Management keeps all employees informed of orders, backlogs and management planning.

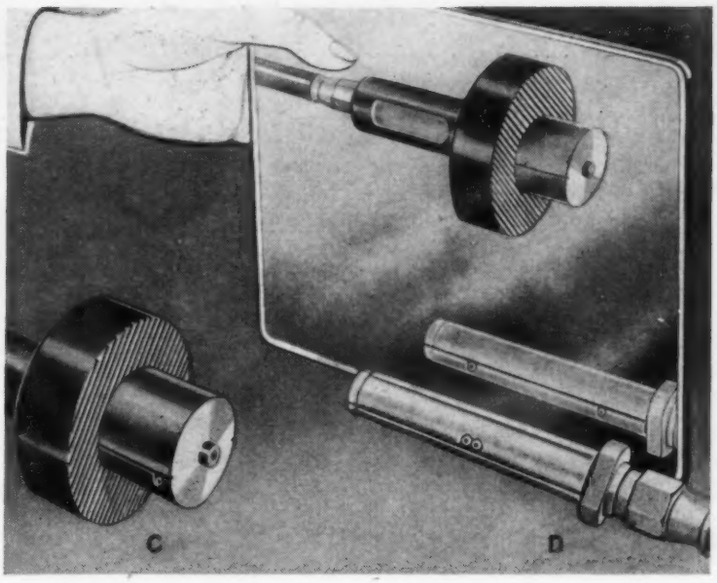
Company F — Employees . . . 1,600

THERE was a steady decline in productivity from 1937 through 1945. In 1937 efficiency on a 100% basis was about 92, and at the end of 1945 was 75. In the latter part of 1945 the management started to install a direct incentive plan. To date around 25% of the direct workers are on the direct incentive. For this group of workers the efficiency rating today is 110.

Company's standards are more accurate and more rigid than they used to be. Though it is not possible to get exact figures for direct labor hours as a total, because many workers have been off standard, the best estimate indicates that total direct labor hours are approximately 94% of standard. As more employees are put on the incentive system, plant productive efficiency is expected to increase.

In addition to tighter standards, the company is requiring better quality of workmanship than formerly. There is less fitting on the assembly floor, and tolerances are maintained to a higher degree than during previous years.





Annular jets on the gaging head at (A) permit instant determination of average diameter. Complete exploration of a bore is performed with the gaging head at (B). Out-of-round is shown by revolving the head 180°. Squareness of a face with axis of a bore is checked with the gaging head at (C). Hole straightness is inspected with the gaging head at (D)

MULTIPLE AIR GAGING OPERATIONS

BY W. FAY ALLER

DIRECTOR OF RESEARCH, THE SHEFFIELD CORPORATION

"NECESSITY is the mother of invention" is not just another trite epigram when applied to air gaging. Inspection engineers were plagued with the inadequacy of known tools for accurate exploration and measurement of holes.

The several precise comparators available were limited in usefulness to external dimensions of parts adaptable to bench comparator inspection. This left the bulk of precise gaging to the mercy of inadequate stop-gap methods, resulting in unnecessarily high production costs and inferior products.

Internal inspection equipment, particularly, had failed to keep pace with engineering and production requirements. An urgent need had developed for both external and internal inspection equipment of greater accuracy, flexibility, universality and speed; without the usual inherent weaknesses due to lack of cleanliness and operational skill. Modern air gaging is the answer to this challenge of production.

The urgent need for means of accurately exploring and determining size of bores ended in the acceptance of several gaging heads. One is used for determining average diameter, its annular jets giving the equivalent of instantly averaging an infinite number of readings. A second is used for the complete exploration of a bore. Its two oppositely located jets allow measurement across diameter, and movement through the bore indicates bellmouth and taper. Out-of-round is determined by revolving the gaging head only 180°.

Another gaging head checks the squareness of a face with the axis of a bore. The connected jets, spaced diametrically opposite, one at each end of the bore, give a reliable check of squareness when the part is revolved with the face in contact with the shoulder on the gaging head. This gage head can be adapted for determination of hole straightness. A balanced construction is obtained by placing two jets in line at extreme ends of the bore and connected to two jets diametrically opposite and located near the middle of the bore.

The four described gaging head principles, with minor variations, permit evaluation of any condition within a bore accurately and conveniently. Holes 0.100 in. in dia. upward may be explored to any depth either at the gage or while still in the machine.

Applications of several gaging heads developed for internal and external measurements are shown in this second and final article on modern air gaging practices

INCREASED INSPECTION SPEED

As gage heads are always a few ten thousandths under the minimum bore size, entry is easy and friction is greatly reduced, resulting in increased speed of inspection as well as a vastly extended wear life. Inasmuch as the gage is always set up with maximum and minimum setting rings that are subjected to little

wear, no accuracy is sacrificed until the gaging heads have worn out.

A life expectancy of 50 times that of the fixed gage is a conservative estimate. The cylindrical portion of the head serves only to carry, protect and approximately position the jets which actually do the measuring. Any amount that the gaging head may be shifted in the hole will not affect the accuracy of gaging, and consistent results are obtained with skilled or unskilled operators.

Air is forced from the jets with sufficient pressure to remove oil or other foreign materials from the surfaces being gaged, making cleansing unnecessary in many cases. On the other hand, this gaging pressure when converted into unit pressure is many times less than that of mechanical contact gages. Parts having extremely thin walls are measured without appreciable deflection.

External measuring received all the advantages given to internal measuring by the development of suitable gaging heads, usually termed "airsnaps."

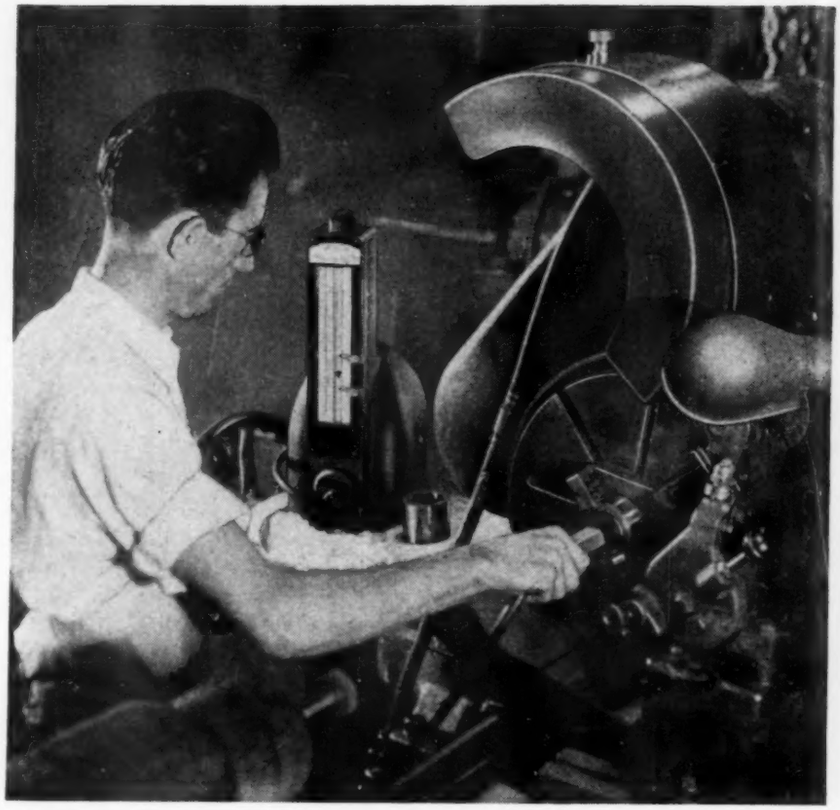
A gage block comparator makes use of the balanced jet design, one being placed in the lower anvil and the other mounted directly above on the widely adjustable bracket. An amplification of 50,000 times is accomplished giving consistent indications without the necessity of wringing the blocks to the anvil, operator skill or precise surfaces on the anvils.

SIMULTANEOUS CHECKING

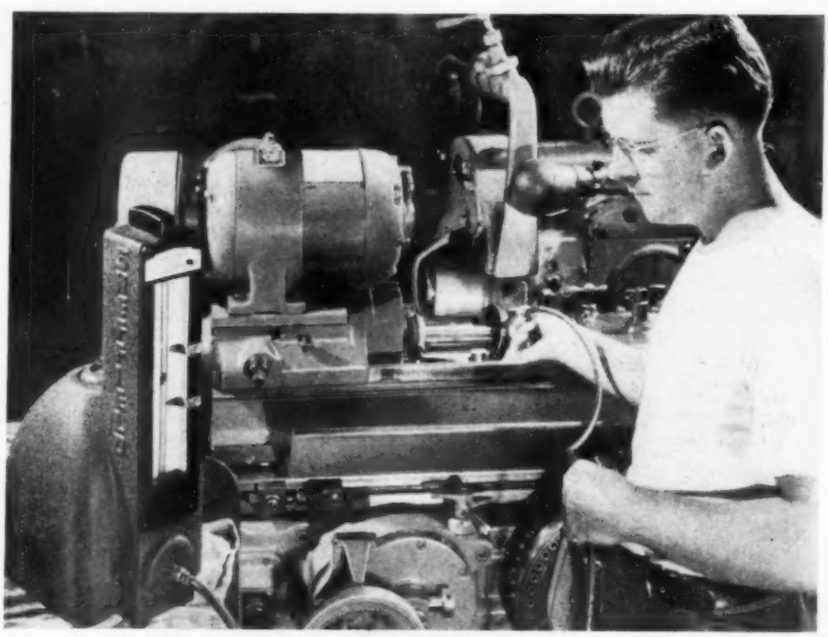
It is often desirable to check a number of conditions simultaneously for economy in time and space. The possibilities in this direction by air are unlimited. An instrument and fixture which simultaneously checks outside diameter, inside diameter, concentricity and bore squareness to one face is available.

A special fixture is used for checking all main bearings of an automotive crankshaft in three places simultaneously. The individual gaging heads are flexibly mounted to contact the bearings correctly in spite of limited error in location or misalignment. The crankshaft is nested at either end while the gaging heads are in the protecting base. They are pulled into gaging position as a unit.

An outstanding example of multiple air gaging involves a machine which checks the bore of automotive



HOLES may be measured accurately by air gaging while the part is still in the machine

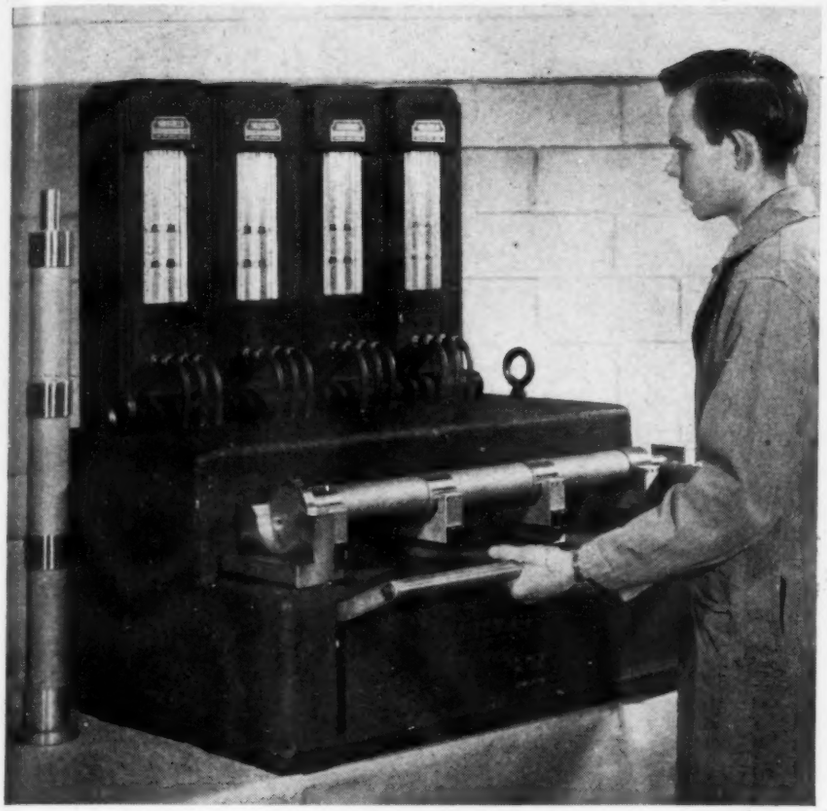


EXTERNAL DIAMETERS are measured precisely while still in the machine by means of an air-snap gage

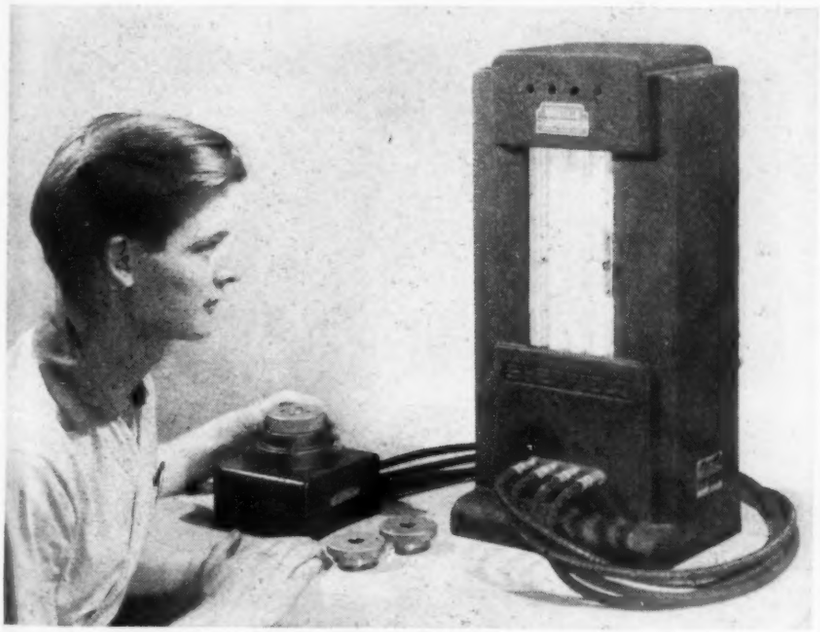
AIR GAGES ARE EXTREMELY FLEXIBLE BECAUSE:

1 . . *They may be applied to either internal or external dimensions.*

2 . . *Accuracy may be taken to formerly inaccessible places.*



AIR GAGING permits checking all main bearings of an automotive crankshaft in three places simultaneously



SEVERAL DIMENSIONS and conditions can be checked simultaneously with this multiple air gage and fixture

3.. Extremely small as well as large holes may be checked.

4.. Parts may be taken to the gage or gage to the parts.

5.. Gages may be used for nearly any type of measurement such as length, squareness, concentricity or parallelism.

cylinder blocks and is placed in the conveyor line leading from the honing station. A hydraulic ram carries the block into position where it is clamped automatically. Eight gaging spindle assemblies enter the eight bores gaging bore diameters at four levels. Each may be individually rotated for out-of-round. The condition of each bore is shown by four connected indicating tubes. A glance is sufficient for the operator to determine whether the bore is sufficiently straight and round and to stamp the size classification indicated with the provided marker.

The examples given are just a few of the many multiple air gaging applications in every day use. The field is still so new that actually and figuratively speaking, the surface has not been scratched, application- or production-wise. But the developments of multiple air gaging during the last six years are truly remarkable. From all indications the next few years will show an even more amazing progress in this field.

TIPS for Top Shop Men

153 Ever ape your big brother or your father or the corner tough? Of course you did, just as you now probably parrot the superintendent's remarks and try to find neckties like the ones he wears. Well, everybody in your department does the same thing. So it's dangerous to be proud of punching out on the split second or of stalling to kid with that blonde at the lunchroom. You think it's your privilege? Maybe, but remember those watching eyes.

154 Friction in brake drums stops the wheels. It does the same thing in an organization. In the first place, it's essential: in the second, it leads to trouble. Remember that friction results from rubbing; don't let anyone rub you the wrong way. You don't have to back down, but neither do you have to get your back up.

155 Watch for the little man with the big head and deflate it periodically. Some people hunger for authority, even if it's only over a helper or the plant cat. When they get it, they abuse it, because they have an ego like a self-sealing blister: Every time you deflate it, it promptly starts to swell again.

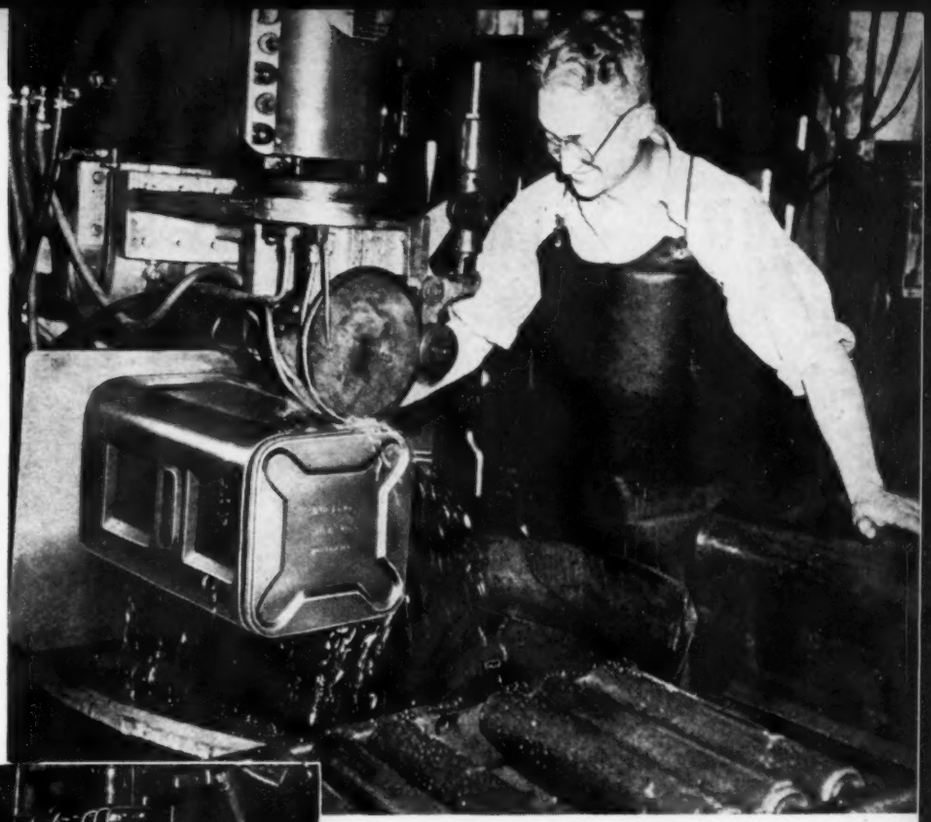
Resistance Welders Mass-Produce Containers

FORMING . . .
A single stamping of 18-gage steel is press-formed into the four sides of the wrap-around body, as shown. The first press stroke makes bends nearest the sheet ends (right), the second forms the inner two, with the body sheet turned 90°. Mating edges are overlapped and tacked by spot-welding on a rocker-arm welder

SEAM WELDING→
A single pass through a longitudinal seam welder joins the 21-in. lap seam. Reinforcing panels and holes for handle clips may be clearly seen, also catch pan for cooling water

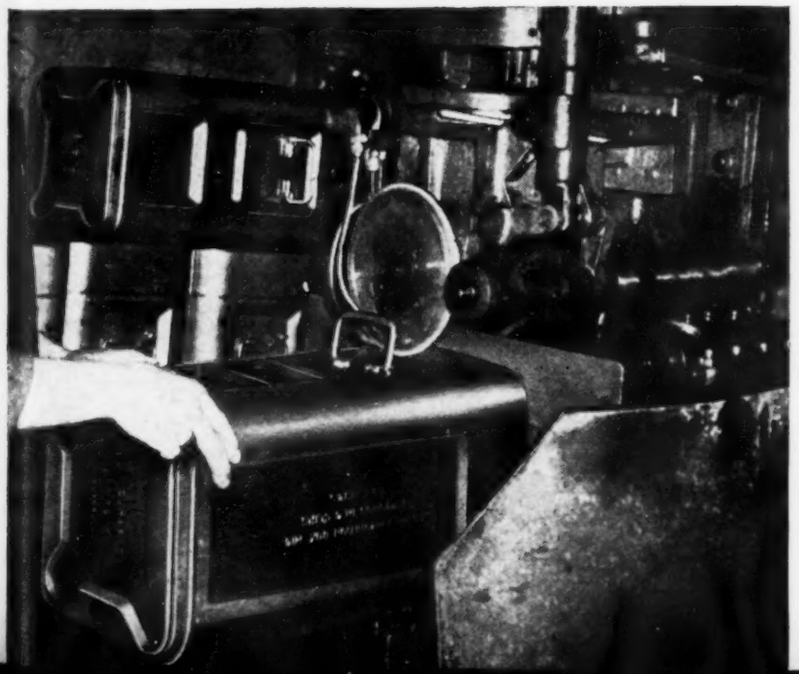
BOTTOM LOCATED→
The stamped box bottom is fitted into place and tacked to the box sides on a rocker-arm welder

COMPLEX 18-gage steel containers are made at a rate of 220 per hour by Durabilt Mfg. Co., Aurora, Ill., by forming and resistance welding rather than deep drawing. Standard spot, circular and longitudinal seam, projection and automatic multi-spot resistance welders were provided by Progressive Welder Company for the job. Similar procedure can be followed in assembling such units as file cabinets and drawers, lockers, etc.



BOTTOMING
The 42-in. bottom seam is welded in one continuous operation on a circular seam welder. The box top rests against a vertical plate at the back and coolant is caught by a roughly circular pan. Containers are delivered and removed by conveyor

LOWER SPACERS
Metal spacers (for 40-mm. ammunition) are spotwelded into the box near its bottom. This automatic unit makes 32 spotwelds, two at a time

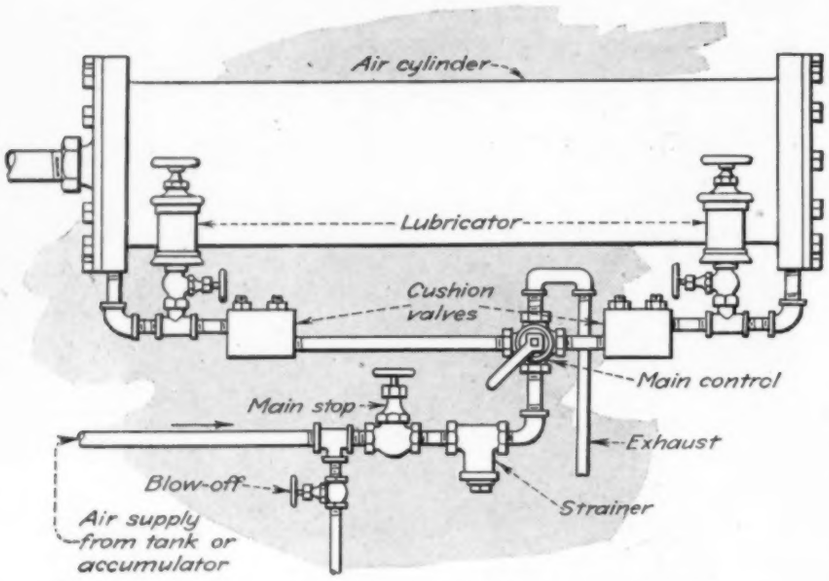


SEALING BANDS
Handle brackets of 14-gage steel are projection-welded to the box on a press welder, then the box is brought to this seam welder to seal in the 11-gage sealing bands pressed into the box top. Another automatic welder adds a top spacer. A cover locking device is projection-welded to a loose cover to complete the box

Don't Strangle PNEUMATIC DEVICES

Careful selection and installation of basic air piping spells success in attaining efficiency from your air-operated equipment

BY JOHN MAYO



Good piping for a horizontal double-acting cylinder should have, in this order, a blow-off, a main stop, a strainer, the reversing valve, 2 cushion valves, 2 lubricators, and 2 cylinder cocks. Piping should be beneath cylinder, if possible, so water will drain off

AS IN so many projects, it's the little things that count with air. The little things are so much second nature to old-timers that they are often just considered common sense. They are carried out correctly by instinct rather than through conscious, deliberate planning, and too often, they are omitted or incorrectly done for misinterpreted instinct or lack of instinct.

Keep Air Pure

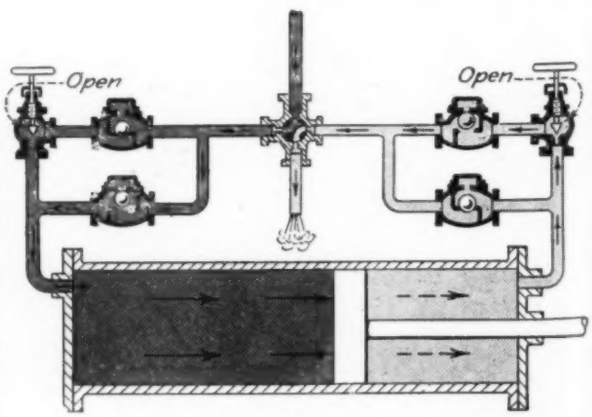
About the largest source of difficulty with air systems and devices is impurity, or the foreign material that gets in through the compressor intake, later to find its way throughout the system. Impurities are of two types, small solids, and liquid mists, vapors or gases. Assuming that there is no way to keep all impurities away from the compressor suction, as is usually the case, it is absolutely necessary to remove them as fast as they collect.

Solids, like common dust and metal or abrasive particles, will damage air-cylinder walls and high-speed air motors alike, but they can be removed easily with a simple gasoline strainer. By far the biggest component, and the most difficult to ban, is moisture, and ordinary water is just as destructive as any acid if allowed to collect and remain on polished steel surfaces.

The weather man tells us what the humidity is every day, and very seldom is it less than 50%. That means that the air is half-saturated with water vapor at the existing temperature. As long as that temperature remains constant or rises, the water can do no harm, but a few degrees *drop* will quickly make the air 100% saturated and the water will then condense out of the air and return to the liquid state, when it will flow by gravity to the nearest low-point in the system and collect. These low points are where you put your traps or blow-downs, and they should be opened before using any piece of air-operated apparatus, or else the water will be entrained and sprayed all through the device.

Lubricate Efficiently

It may be just as bad to over-lubricate as to under-lubricate air cylinders, but it's a little safer to err on the "over" side. Usually, the plain engine lubricator will do the trick very well. It consists of a small reservoir of about ¾-oz. capacity which allows an adjustable, metered quantity of oil to be picked up by the air before it enters the mechanism. Experimentation will quickly show what the adjustment should be. Vertical air cylinders require one lubricator, whether they are single or double acting. If it is in the upper end of the cylinder, there will be enough blow-by to oil the whole cylinder. It is better to use two lubri-



Elements of a throttled-exhaust system are a needle valve and two check valves in each end. Air bypasses the needle going in but is forced through coming out

cators on double-acting horizontal cylinders.

To prevent running dry, lubricators should be filled once a day as a matter of routine. Use a light oil such as S.A.E. 10. Periodically, the lubricators should be filled with kerosene to dissolve and flush away gummy deposits.

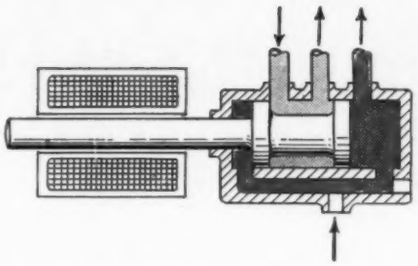
Usual practice in lubricating air hammers, small air motors and similar high-speed units is to provide an oil-mist lubrication in the line near the tool. Slow-speed units may be lubricated with conventional oil cups.

Equipment that has been idle for a long time is likely to be dry, and before running it, it is wise to open the lubricator-needle wide for a short time or damage may result.

Control the Pressure

Even with a large compressor and air storage tank, line pressure will fluctuate as the demand varies. It is usually difficult to correct this, except at the great expense of a lot of oversize piping. (Pressure regulators won't help because the air just isn't there to regulate unless the pipes are oversize.)

Never try to control piston speed by throttling the incoming air. The line pressure may suddenly vary because another machine is operated nearby, or the load on the piston may change, either of which will upset the best possible throttle, and possibly damage the cylinder or some more expensive machine element.



Solenoid-operated reversing valves are surprisingly simple to install and operate and the very flexible control allows remote operation wherever desired, and/or integration with other automatic controls

An air cylinder is a single-stroke, hand-controlled machine, not a flywheel-balanced, governed engine with a complicated valve gear.

Whether it's single or double acting, the cylinder is still hand-controlled and the best way to insure safe operation with good control is to throttle the cylinder exhaust.

One arrangement for this is easy to assemble with stock parts: four ball-check valves, two angle needle valves and a four-way reversing valve. But I designed a special valve 25 years ago which I call a "cushion valve." This combines two check valves and the needle valve into a unit and it is easy enough to build to make it cheaper than its stock-assembled equivalent.

With either of these methods, the air can escape from either end of the cylinder only as fast as the needle valve setting will permit under the three differential pressures which exist, and, as both "throttles" are adjusted independently, the speed of each stroke is separately controlled. The intake air is unobstructed in both strokes.

There are many kinds of reversing valves available, for hand, foot or electric operation. In choosing the valve, select the simplest possible one that will give the desired control, but don't hesitate to use a better valve if the results will justify it. Many special purpose valves for timing, or delaying action, or for automatic cycling of some kind are available but sometimes you have to design your own.

Installing Valves

1. Watch for air locks—drill a pinhole vent if necessary.
2. Ball-check valves, and swing-check valves should be vertical—and must be if there is no spring—so the valve will seat by gravity.
3. Don't make connections too tight or they will crack or be difficult to take apart. Get a better fit and use compound instead.

Operating Procedure

Before starting
1. Blow down to remove water
2. Fill lubricators
3. Clean strainers
4. Test valves

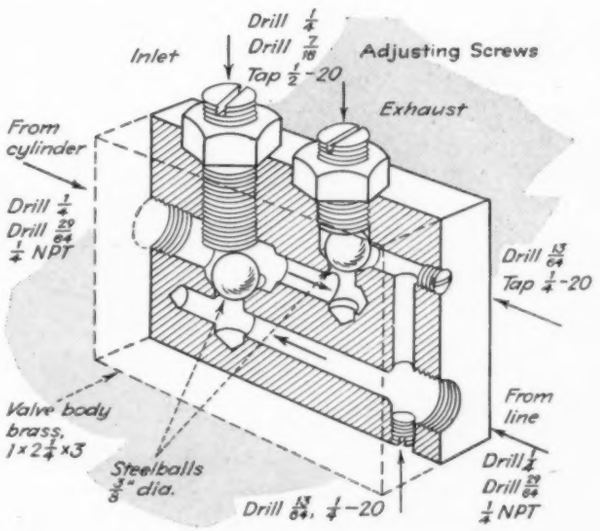
After stopping
1. Close main stop valve
2. "Milk" out remaining air

HOW TO MAKE A CUSHION VALVE

The dimensions given make a valve suitable for any air cylinder up to 5 in. diameter. With that as a guide, enlarge the valve in proportion to the square of cylinder bore and port diameter.

Two 7/16-in. holes are drilled in the solid brass block, followed by the ¼-in. port holes. Before tapping for the ½-in. screws, place a small piece of fiber over the valve seats to protect them from the tap. The balls are effectively seated with a punch and one sharp hammer blow.

The inlet check valve screw should be adjusted to allow as much opening as possible without danger of losing the ball. This works out to a ball travel of about ⅛ in. If the valve is to set the piston speed once and for all, use a headless setscrew and locknut on both valves. If it is desired to control every stroke, the screw should turn freely and have a suitable handle or lever. (Lubricate frequently)



ROUND TABLE

Who Hires 'Em?

"What happened over at the office, Ed? You look as though Personnel was after you again on those job specifications. Why don't you send them right with the job requisitions? Save you a lot of time, and you'll get new help quicker, too."

"I went to Jackson about that man I asked to come in—tried to find out why he wasn't hired. While I was there, Jackson told me not to ask any more people to come in—that he or someone else in Personnel was hiring all the help now."

"What's the matter with that? You ought to be happy that you've got somebody to take that load off your mind. Hiring help is no snap these days, anyhow."

"Yeah, Al, but I still would rather pick my own. Some of those dummies Personnel sends me couldn't get a job with their parents, let alone with me. Personnel can't tell if a man is skilled or not, and then I have the headache of trying to unload the guy when he turns out to be no good. No, sir, If I did the interviewing, I'd soon find out if the guy knew enough to work for me."

"But, Ed, just think of the time you'd save if you didn't have to go down to the Employment Office every morning, interviewing new hires. You're too busy to be tied down with that. Besides, it saves you from having to hire friends or hiring guys because you like their looks."

"Wait a minute, now—"

"No, you wait a minute. Remember that men are hard to find these days, and Personnel hires people not for what they are, but for what they can be if the foreman will spend a little time training them. If you hire toolmakers, you'll always be looking for the fellow who knows all the answers, and at that rate, not many people are ever going to be hired."

"That all sounds swell, but I still say the department will have fewer clucks if I can pick out the man I want for the job. Saves training time and paper work, fewer replacements, no difficulty trying to release people we should never have had in the first place. Then, when someone comes along like this guy did this morning who I know is good, I can hire him and no questions asked. But look at what happened: Jackson let a good toolmaker slip through his fingers, just because I didn't get the chance to come down and grab the fellow before he got away."

"You're forgetting two important points, Ed. First, if you would only specify the kind of help you need, naming the exact requirements of the job on the requisition, you would stand a much better chance of getting the people you really want, men who can do what's required. As it is now, you never take the trouble to say you want anyone but a 'man.' And, naturally, that's all you're going to get—a 'man.' What he can do or what he is supposed to do, no one knows. Then, the second point—you must remember that more than just job qualifications must be checked. Maybe the guy has a criminal record, his reputation might be bad, his credit no good, a gambler, a long list of quits, trouble at home, physical handicaps, financial entanglements, and so on. Personnel can check these better than you can."

"A, I still say, Jackson let a good man slip."

WHO GETS THE BETTER MAN, *the foreman by talk-and-try, or Personnel with its interviews, tests and so on? Or should they work together? Your comments and experience will interest other readers. Discussions of earlier topics appear on later pages.*

Practical Ideas

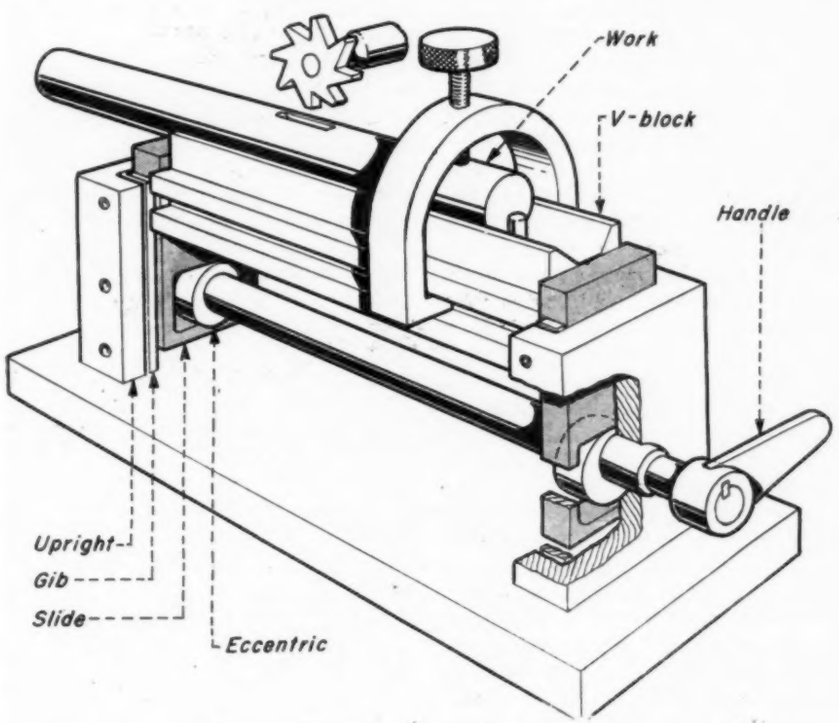
Disk Eccentrics Drive Key-Seating Fixture

A. F. SCOBLIC
Milwaukee, Wisconsin

I recently worked out and designed a fixture for milling Woodruff key slots in small shafts. The fixture was to be used on a small milling machine that had no vertical feed and will work equally well on a lathe. Since the fixture was made several weeks ago, it has been in constant use in our shop, and it has met with great success.

I will first compare a few points as to the difference between power feeding and hand feeding a Woodruff slot. In power feeding, the feed must be set for the most difficult part of the cut (which is at full depth) so the feed must be set low. As a result of this very little stock will be removed at the beginning of the cut. The deeper the cut, the more danger of breaking the cutter. In comparison, the application of a hand feed permits the operator to "feel" and regulate the feed according to the strain on the cutter. It has been proven that this hand feeding is considerably faster and safer than the power-feeding. Also, with the power-feed, there is danger of going too deep or not deep enough. By the use of the fixture described in the following paragraphs, the depth of cut is absolutely maintained on every piece, and without effort on the part of the operator.

The fixture is built up mainly of cold-rolled bar stock and fastened together with capscrews and dowels. A base plate and two uprights comprise the main frame. The base has two keys to fit the slot in the milling machine table. The uprights are milled out in the form of a "U," to receive the end pieces of the slide. The slide assembly consists of a V-block bar, with grooves on the sides to receive the clamp. The end pieces of the slide are slotted horizontally to receive the cams on the shaft. The slide assembly is kept rigid by a brass gib at each end and a screw at one end to take up the thrust or end play. A stop-pin is inserted in the V-block as a back-up stop for the end of the shaft being milled. The size and length of the V-block are governed only by the capacity or dimensions of the shafts to be worked.



Hand-fed eccentric cams lift slides and long V-block for uniform keyway cuts

The shaft is made with a bearing at each end, which fits into the uprights. One end of the shaft is extended to receive a handle about 12 in. long, keyed in place. The lever must be in a horizontal position when the high point on the cam is either at its up or down position. In operation, the lever may be moved past the horizontal position, but the up and down limits always remain the same. The cams on the shaft are turned ¼ in. off center, which gives a total of a ½-in. rise, with a half turn of the lever. A feature that may be added to reduce wear on the slot in the end pieces of the slide, is to place a standard drill bushing liner over the cams. By doing this, there is merely a sliding action in the slot, while it allows the cams to "roll" in the bushing liners.

To set up the fixture for operation, the lever is held in a horizontal position with the high point of the cams in the "up" position. The milling cutter is then fed into the first shaft to the proper depth, using the hand feed on the milling machine. Next the lever is rotated one-half turn which lowers the shaft and

clears the cutter from the work. To mill additional shafts, it is only necessary to insert the shaft, tighten the clamping screw and rotate the lever to the opposite side, raising the shaft. Thus the key slot is cut, and the lever is reversed to lower the shaft for unloading.

Toolpost Grinder Trues Straightedges

FRANZ E. WELLS
Massena, N. Y.

Straightedges are used for so many kinds of work that absolute accuracy is the only safe bet. They might be used to check a planer bed, miller table, surface plates, or a "hill and dale test" in a long key-way, so don't take chances.

Here is a trick that will eliminate warps, chatter or any other distortion. When you are truing up a long-surface job, don't forget that a cut of any depth means *some* amount of pressure and that almost invariably means distortion in that particular type of truing.

It is O.K. to use a tool for knocking down but don't try to go in any closer than about 0.01, or 0.005 in. at the closest.

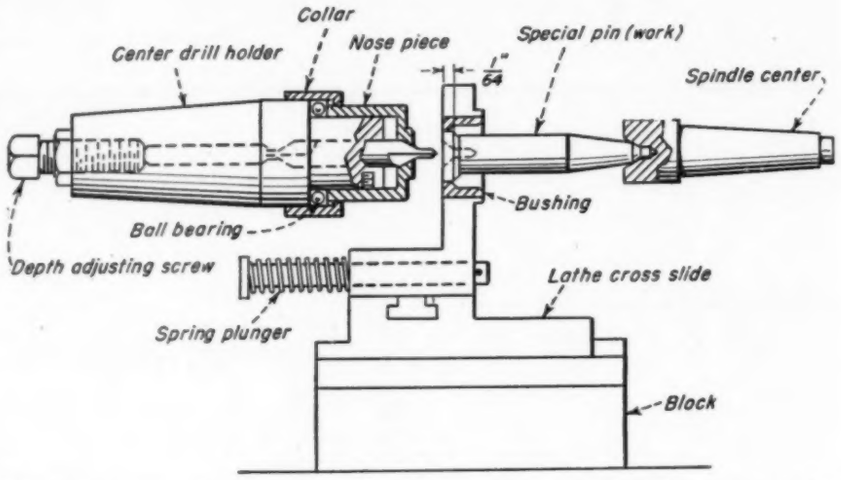
Take your tool out, "borrow" a toolpost grinder from a nearby lathe and put it in the planer head. The rest of the trick is A.B.C.

Use a small wheel of about 1½-in. diameter. The smaller the wheel the less surface there is in contact with the work and therefore the less chance for heat to throw the surface out of true by expansion. A light feed is advisable for the same reason, to avoid overheating.

I first saw this toolpost grinder trick back in 1915 when my Dad, a toolmaker, and machine designer for about 35 years used it.

About two years ago, I had a chance to use it myself when I was working nights in a paper mill when I had to sharpen a #2 knife 60 in. long on a flat-bed stripper I was running. I did the job in the mill's machine shop. The setup I had was a dandy too, a Brown & Sharpe tool —post grinder and a small Norton grinder wheel #3860-L5BE.

Here are some wheel grades you can use with jobs like that: cast-iron, 3760-J-Crystolon; hard or tool steel, 3850-L5BE; soft steel, 60-M5BE; general, 46-N5BE.



When the center hole is used to locate small parts longitudinally, use this center drill stop

Adjustable Center Drill Cuts To Accurate Depth

DONALD A. BAKER
Boonton, N. J.

A dowel pin was rough-turned and cut off on a hand screw machine. It then required centering at both ends before hardening and grinding to final dimensions. To maintain the 1/64-in. head thickness it was necessary that the head end should be accurately centered longitudinally. To do this a cross slide taken from a bench lathe is mounted on a raising block to adapt the cross slide to the bed of a speed lathe. In the spindle of the speed lathe the center drill holder is placed with the center drill held by a setscrew. The nose piece was fitted over the holder and hardened, ground and retained by the collar which was pressed on while ball bearings take the thrust of the nose piece. The work holder is an angle plate with a bushing. Hole for this bushing has bored in place in perfect line with the center drill.

In operation, the center drill is first set to give correct depth by means of the adjusting screw. Work is placed head first into the bushing while the other end is located in a female center which fits into the spindle of a hand-lever controlled tailstock. When the tailstock is brought forward, the spring plunger first strikes against the headstock. Continued forward motion brings the center drill into action and this continues until the nose piece strikes against the head of the dowel. Then, as the tailstock is retracted, the spring plunger returns the slide.

A different bushing was used for centering the small end of the dowel, and as accuracy was not as important, a tailstock stop was used instead of a nose piece.

Setscrew Wrench

Where a hollow setscrew is used in a cramped location, inside a pulley for instance, time will be saved if the short end of a setscrew wrench is broken off and used to spin the screw into place. Then it can be tightened with a regular length wrench in the usual manner. This procedure will eliminate the necessity of slowly turning the screw one or two hexagons at a time. *Thomas Trail, Baltimore, Md.*

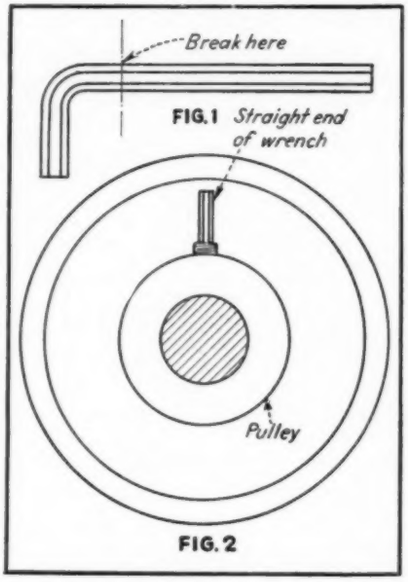


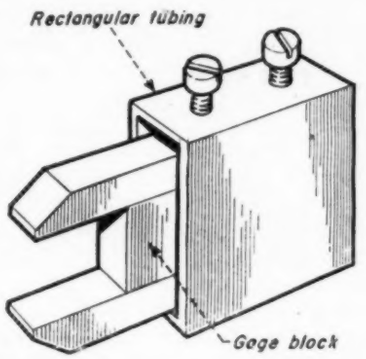
FIG. 2

Built-Up Snap Gages Are Simple and Economical

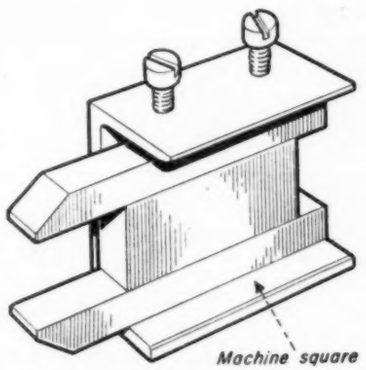
R. KADEN
New York, N. Y.

Anyone who has had an opportunity to set an adjustable A.G.D. snap gage must admit that it is a laborious task. Furthermore, when an accuracy of 0.0002 in. or better is required the results are far from satisfactory.

The gage shown does not have to be set. Moreover, its accuracy is limited only by the precision built into the spacer and the contacting surfaces of the jaws.



Small built-up gages have a rectangular tube for the holder



Larger gages use a short piece of squared aluminum channel

Obviously, the idea is not original. Most gage block sets contain jaws for the purpose of building temporary gages of this kind. However, it is not recommended practice to leave gage blocks wrung together for any length of time, nor is it advisable to expose them to the rough usage of production checking.

The gage illustrated can combine the accuracy of gage blocks with the ruggedness and economy of an open end wrench. It consists of nothing more than two jaws, a spacer, and a clamp. For close dimensions the contact surface of each jaw should be ground, or better yet, ground and lapped. To prevent side movement, the upper jaw should be spot drilled to receive the points of the screws. If ground toolbits are used as jaws, a roughly ground "V" groove suffices. The spacer, of course, must reflect the precision demanded by the specifications of the piece to be checked. But for that matter, any surface grinder will produce a spacer which is far superior to the parallelism and accuracy of adjustable snap gages on the market. As for the clamp, it does not necessarily have to be made of square tubing or channel iron as shown, but these do have their merits. Square tubing is available in a variety of sizes and thicknesses. For gages measuring up to about ¾-in. copper tubing having 0.040-in. wall and ⅝ x 1¼-in. inside dimensions does exceedingly well. Light channel iron or alumnium channel provides a satisfactory means of clamping for larger sizes.

Feedscrew and Taper Shank Improves Lathe Tapping

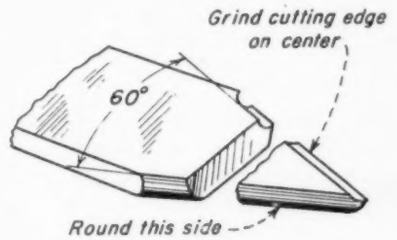
JOHN BEYEN
Sidney, N. Y.

Conventional tailstock-centered lathe tapping is awkward and unreliable, and definitely unsatisfactory in any sort of repetitive operation.

The principle of this tool is easy to apply in a variety of ways, even to occasional jobbing work. A standard tap chuck may be used or one made up as suggested, but the important thing is a long threaded spindle which has the same pitch as the tap being used. If these screws are to be made up for several tap sizes, leave a long head so the tap shank, setscrew and handle will all fit into the one-piece screw. Otherwise, one chuck will serve, but it must be provided with a means for holding the various screws.

The nut for this feedscrew is a discarded taper-shank drill, tapped and counterbored. This will fit snugly into the tailstock and make the too very easy to set up.

Once this method is adopted for general use, the tap, holder-screw and taper-sleeve nut are kept as an assembled unit in each size. One handle rod will serve for all.

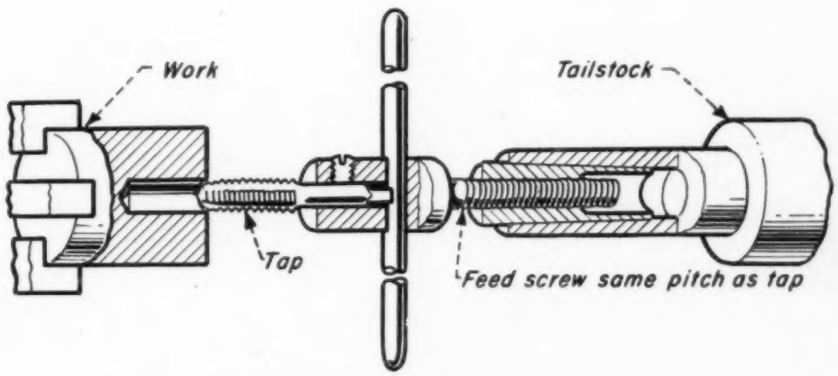


How to Shift a Center

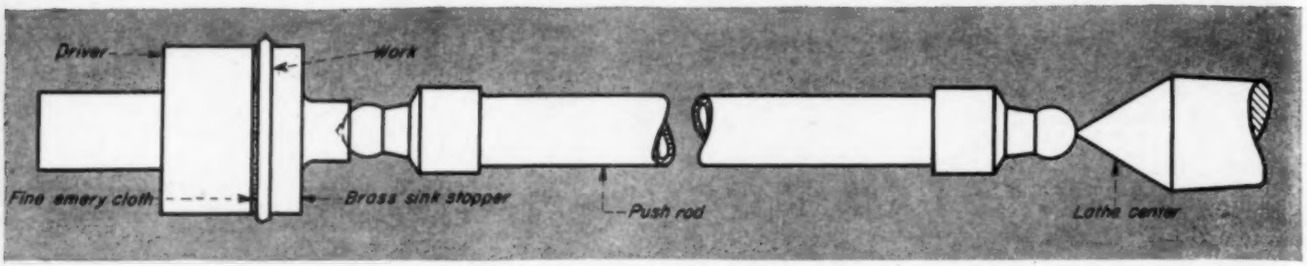
FRANCIS B. DIAL
Long Beach, California

Often there comes a time when a center hole has to be moved a half-thousandths or so. Here is a simple tool to perform this effectively.

Take a flat piece of tool steel like an old file and grind a 60° point on one end. Grind one side round and smooth so it won't cut. Grind the other side to half the thickness so the cutting edge will be on center and therefore true. Relieve the bottom, preferably at a varying angle to give the proper cutting clearance all along the steeply tapered hole. Of course, the point itself will be very thin, and the center should be counter-bored out as large as possible.



Left-hand wrench-shank thread feeds tap automatically



Universal pushrod and pressure plate holds sheet stock against faceplate for diameter turning without marring faces or interfering with cut

End Pressure Holds Lenses Securely Against Faceplate

A. V. KILPATRICK
Assoc. Prof. of Mech. Engrg., Mo. School of Mines and Met.
Rolla, Missouri

Truing in a lathe the roughly cut diameter of a thin sheet-metal, wood or plastic disk presents a chucking problem. We had to make some red and green Plexiglas "lenses" for special viewing glasses and here is the simple method we used to hold them.

A small faceplate carrying a fine emery-cloth disk was chucked in the headstock. The paper-protected Plexiglas was firmly held against the non-slip emery surface with a faced-off sink stopper and an aircraft engine pushrod using the tailstock center to apply the pressure. A ball and socket joint at the sink stopper end allows for slight misalignment and assures uniform distribution of pressure and a prick punch hole at the other end to receive the tailstock center reduces friction so the pressure plate will rotate easily with the work.

For production work, a locating gage can be used to place the pieces approximately in position and the pushrod can be made in two telescoping sections with a heavy compression spring to eliminate continual tailstock adjusting.

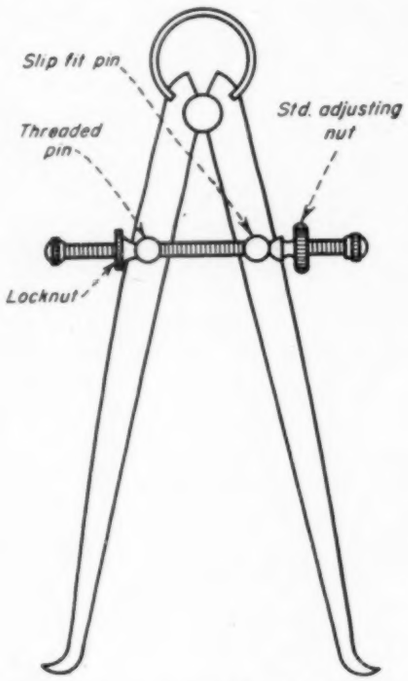
Center the Screw On Inside Calipers

ALBERT H. YOUNG
Victoria, B. C.

While there is no mechanical wizardry involved, and no millionths of an inch to take your breath away, here is a simple solution to a problem that daily harasses every mechanic who uses a pair of calipers. It increases the usefulness of the commonest and most used tool in every machinist's kit. Existing tools can be altered at trifling expense.

Every machinist and engineer in North America has two or three pairs of the familiar spring inside calipers. I have five. They are the handiest tool of their kind for measuring holes in average machinist work. But I must also carry a line of old-fashioned firm joint calipers of the same capacity because the adjustment screw on the spring inside prevents them being used on a hole deeper than the distance from the points to the adjustment screw.

I also use these spring calipers for measuring the major diameter of inside threads. This is the common practice on average machine work.



Remove pivot on riveted end, substitute threaded pin and furnish screw with a lock nut so screw can be centered for gaging deep holes

The points are ground to suitable shape for getting to the bottom of the threads and set so that there is a little side play. This is greater as the pitch of the thread increases to allow for the greater diagonal position then occupied. When set, the points are closed with the fingers, the calipers withdrawn and allowed to spring back against the nut. A practically accurate size is thus obtained.

I was recently responsible for replacing a worn seat in a marine boiler check valve. The seat was screwed into place and on a high pressure boiler, the job must be sound, so an accurate size was necessary. The job was urgently needed but the only tool available for the measurement was a pair of spring insides. The thread, however, was eight in. down the hole and because of the adjustment screw they would only reach down four. The firm joint calipers were unsuitable for thread measurement.

All and sundry interested persons joined in cursing the limitations of spring inside calipers. As I was about to cut a piece off the adjusting screw I hit upon the idea of altering its position. This consisted in driving the screw out of the pivot pin on one of the legs, borrowing a nut from another pair and placing the screw in the center with a nut on each side.

When this is done, it is so ridiculously simple that one wonders why nobody thought of it before. The idea was received enthusiastically by other machinists but a search of tool catalogues reveals that it is not on the market. I therefore submit a design which I am sure will earn the blessings of half a million machinists who have at one time or another had to discard their spring insides and fall back on an old-fashioned pair of inefficient firm-joint relics.

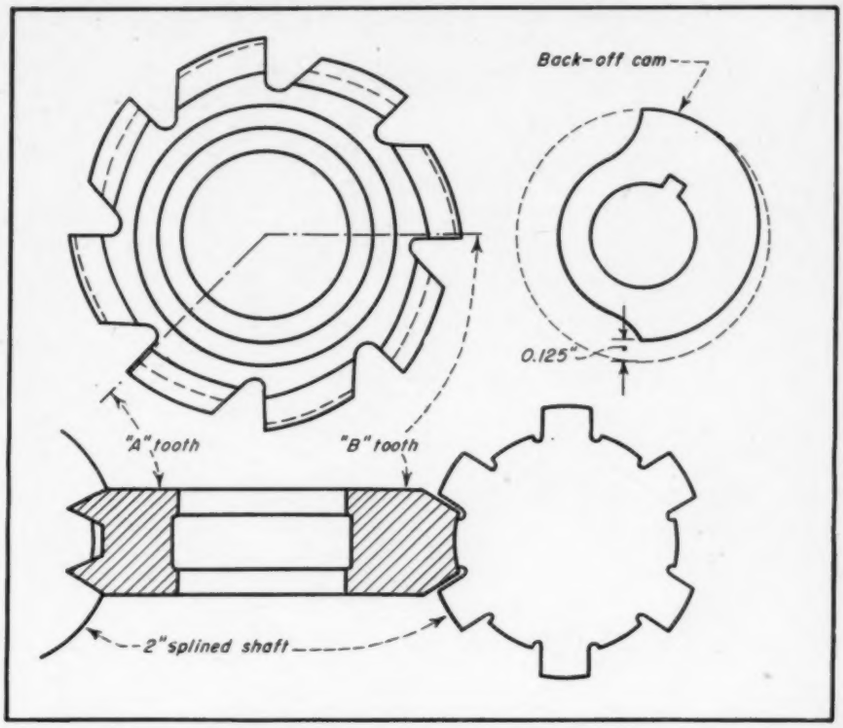
Don't Make Form Cutters Too Complicated

A. R. RASEL
Rio De Janeiro

Rather than try to put the entire profile into every tooth, it has proved successful, particularly in spline milling, to divide the profile into two stages and grind alternate teeth to perform each stage. The result is like two superimposed 4-tooth cutters because adjacent teeth make entirely different cuts and chips have plenty of time to clear before another cut is taken on the same material.

Here, the "A" teeth mill the walls and groove radii and the "B" teeth mill the core. In this way power is saved, and more important, the cutter is easier to grind.

After making the cutter take a trial cut and note which teeth cut high. The back-off cam on the lathe toolprost grinder has 0.125 in. back off in 180° and all teeth are ground with this relief. If one tooth should cut 0.001 in. too much, from the cutter diameter, calculate how much to remove from the face. For this cutter it worked out at 0.009 in. Once all teeth are cutting uniformly, the cutter may be reground like any form cutter.



Four alternate teeth on this milling cutter have one profile while the other alternate four complete the spline contour

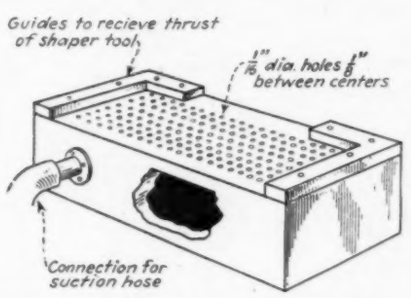
Small Plastic Blocks Clamped with Vacuum Chuck

H. W. HEACOCK
Champaign, Ill.

In making research specimens of polystyrene, a unique holding device was developed. It was necessary that the specimens be a uniform thickness (0.156 + .001 — .000 in.) and have a smooth check-free surface. Samples were cut from a large piece of material on a milling machine. A relieved saw was used with compressed air for cooling as no liquid can be used on specimens. This gave satisfactory thickness but produced a check, making them unsuitable for use in research. Machining specimens on a shaper was known to give an acceptable finish but holding was found difficult due to pliability of the material.

As a last resort, an air-tight metal box was constructed. Then a series of small holes were drilled just within the outside dimensions of the specimens (2x14 in.) in a honeycomb pattern in the top of the fixture. An exhaust outlet was added to the side for connecting a suction pump. Bottom and top were surface-ground for parallelism and right-angle guides were added to the top to locate and receive the tool thrust. The completed jig was secured to the shaper and a suction pump connected using a flexible hose. After starting the exhaust pump and machining several specimens, it was found that enough suction was developed to hold the work flat against jig and that thickness varied only five ten-thousandths.

No doubt there is a limit to size of cut and work that suction will hold, but in this case it solved a tricky problem and proved highly successful.



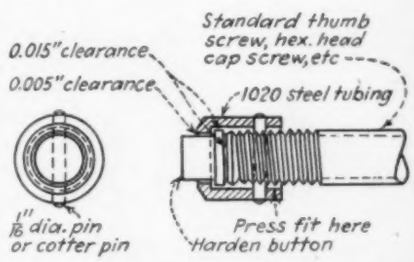
Holes in box chuck allow vacuum to act, holding part down while end guides take the tool thrust

Non-Marking Shoe

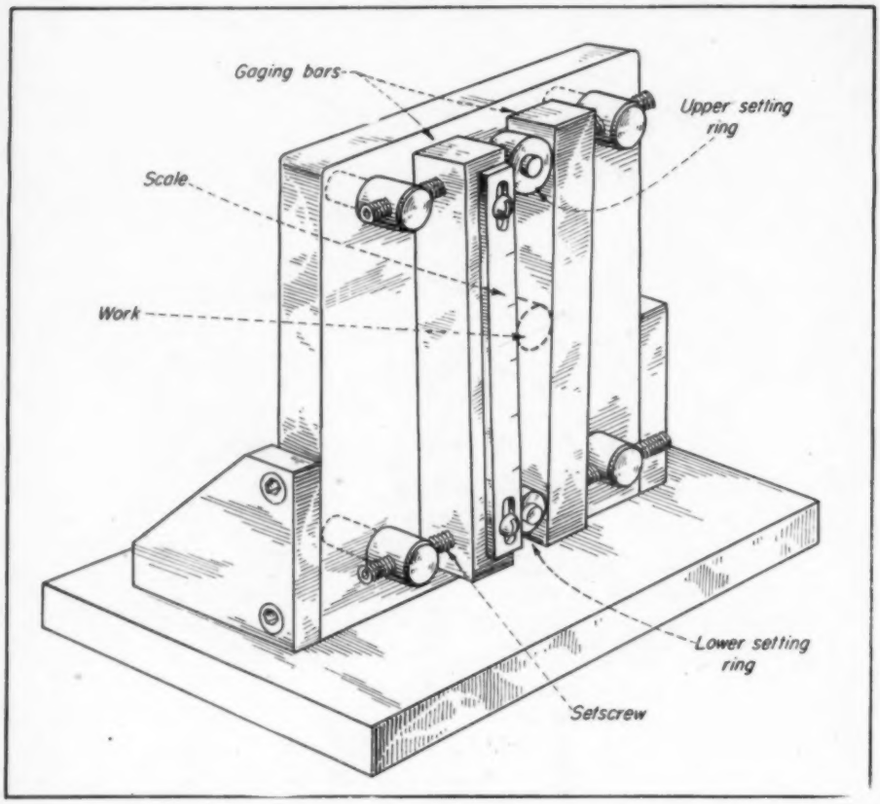
V. A. RITZ and R. MERY
Farmingdale, N. Y.

There must be several hundred ways of preventing a screw from marking a finished surface of a part, but many are expensive, break, or don't work all the time.

We have devised a cheap way of putting on a button on the end of any standard screw. If you will look at the sketch that we have sent along, it will explain itself. The 1020 steel tubing is counterdrilled and cut off in a lathe, or screw machine. The button is turned and then hardened, no polishing is required. The only thing left to do is, to put it on the end of a screw, cross drill and put in the pin.



Floating hardened button allows for self-alignment and prevents screw from scraping polished work



Assorted diameter setting rings fit over pins, top and bottom, to set the taper between two gaging bars, held against the rings with four setscrews. Adjustable scales fit one bar to indicate greatly magnified diameter differences

Adjustable Gage Sorts Round Stock Accurately

B. MOGAL
Union, N. J.

A diameter sorting gage that can be quickly and accurately adjusted to sort different diameters can be made very inexpensively without requiring extreme precision in the individual gage components.

A change to a different size is made simply by loosening the setscrews which hold the gaging bars against the setting rings. The upper and lower setting rings are replaced by ones of proper diameters for the different sizes and the gaging bars are locked up against the setting rings. The scale which is fastened to one of the gaging bars is marked off to conform to the various sorting ranges. Both ends of the scale are slotted to allow for any correction which may be necessary.

An upright piece of steel is screwed to a base and two side braces are added to make a reinforced angle plate. Two dowel pins are pressed into the upright. The dowel spacing should be some even dimension to make the calculation of scale divisions easy. Two pairs of holes are drilled and reamed in the upright piece to accommodate the setscrew holding plugs. These plugs should be a slip fit in the upright as it is desired to move them radially in order to enable the setscrews to bear flat on the gaging bars as the angle of the gaging bars changes according to the difference in diameters of the setting rings. A slot is cut in the upright directly behind the gaging bars as it may be convenient in some cases to gage shoulders or recesses and the remainder of the workpiece is then allowed to project into the slot without interference. The gaging bars are made of gage stock or tool steel and are hardened and ground. One bar contains two tapped holes which accommodate the sorting scale.

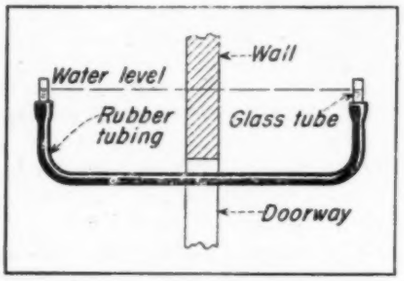
In operation, the workpiece is placed between the two gaging bars and brought down to rest where its dimension is then easily determined by noting its scale position.

How To Align Shafting Through a Wall

E. R. VERNON
Calgary, Alberta

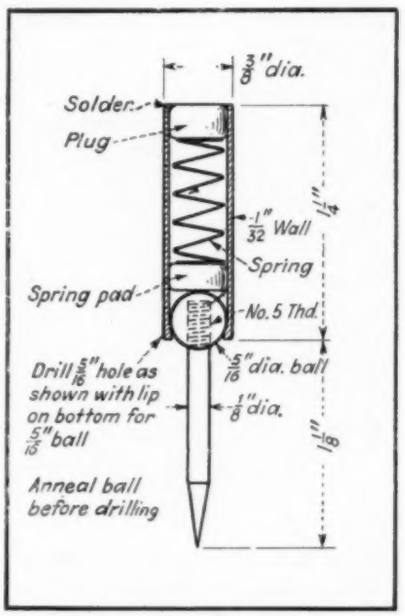
To establish a horizontal line and locate any point on that line or plane, regardless of walls or intervening obstructions, I use a waterline.

At the known or base height from which other points are to be located, fasten a glass sight tube. The lower end of this tube is attached to a rubber tube and another sight glass is at the other end of the rubber tube. Fasten the second glass in the approximate position for the desired height mark and fill the tube with water, then add water a few drops at a time until the level is exact, and this will be duplicated.



Wiggler

Crimp the lower end of a short tube so the ball won't drop out, insert the pad, spring and plug and solder the plug in place. *Glenn Glassett, Ft. Wayne, Indiana.*

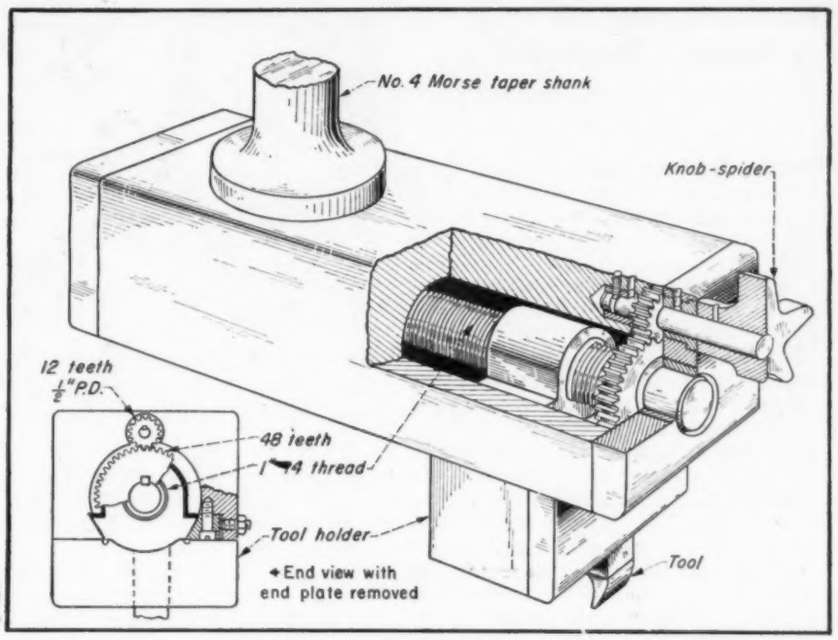


Geared Fly Cutter Has Built-In Feed

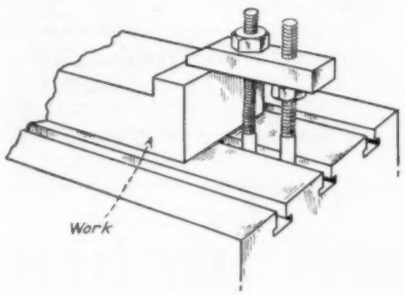
CHARLES RIDWELL
Wichita, Kansas

The long reach of the radial drill has been combined with the automatic feed of a vertical boring mill by using a self-adjusting fly cutter. On a large casting with several surfaces to face, it permits doing the whole job without moving the work at all.

The body of the tool is a rectangular bar drilled so the hole breaks through one side. The edges of this break are planed into dovetails, and because the contour of the metal is already nearly the proper shape, very little metal has to be removed. The toolholder fits the dovetail, and slips freely in the drilled hole, but it is drilled and tapped to feed along as the 1-in. 14-thread screw extending the length of the body is turned. Four to one reduction gears and a 5-point spider-knob give a feed of 0.365 in. per revolution if the spider is tripped by a single finger.



Spotfacing and step-boring in a radial drill without changing tools are accomplished with this adjustable fly cutter



Milling Machine Clamps

A. F. DYCK
Ontario, Canada

A lot of time is lost in many shops looking for proper clamps and blocks to hold a job on a milling machine. Very often the blocks are irregular or rough and damage the surface of the table.

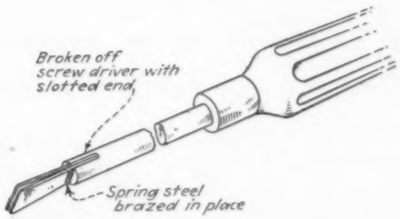
To overcome these difficulties two clamps were made, hardened and ground. Two clearance holes were drilled in each. Four screws threaded all the way were screwed into threaded holes in two keys. The keys were made to slide freely in key slots. Two nuts are put on each clamp, one to hold down, the other to act as support from underneath for the other end. Several sets of screws of different lengths can be made which will hold a variety of work.

Expanding Screwdriver

ORVILLE K. PERKINS
Sonoma, California

To make a "screw starter" slot the end of a rod and insert two pieces of annealed hacksaw blade and braze in place. Retemper the blades, spread apart slightly and grind to shape.

This device will locate and start a screw in inaccessible spots so an ordinary driver can finish the job.



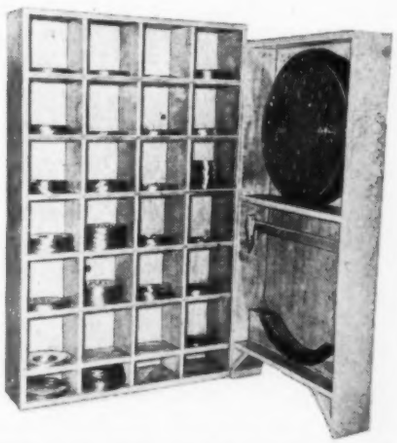
Storage Cabinets Protect the Hydro-Lap Machine Rings

K. P. BABCOCK
Westinghouse Electric Corporation
East Springfield, Mass.

Where hydro-lap machines are permanently used for several runs of material, each differing in size and shape from the other, it is obvious that there must be a variety of ring sets available to handle such production.

The rings, unless properly cared for, can be extremely expensive and a material handicap to production because of sets broken from loss or damage to one or more rings. Carelessly leaving ring sets or individual rings on benches, window sills, etc., creates an untidy departmental condition, damage and ring loss, dirty rings and an extensive loss of time in hunting for the proper rings.

We have built two cabinets that have solved this problem with success beyond expectation. One cabinet has 24 compartments that are 10 in. square and 9 in. deep with a bottom that pitches 1 in. from front to back to insure the rings staying on the shelf rather than sliding outward.



Hydro-lap sets are now protected in this conveniently accessible cabinet

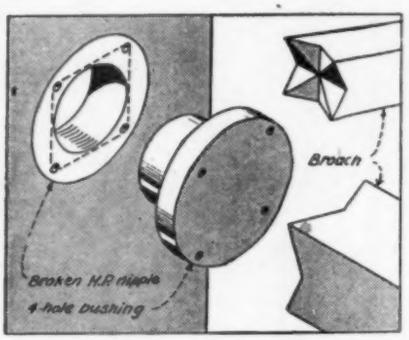
Broach a Square Hole To Remove a Broken Bushing

ALLEN T. ROUDEBUSH
Hamilton, Ohio

During the war high-pressure brass fittings used by the Navy on hydraulic equipment sometimes broke off leaving a brass nipple, having 1-in. pipe threads on the outside and a bore of ½-in., broken off in large steel castings. The latter could not be moved to the shop for removal of the nipple and no clearance was available for using a portable drill large enough to bore it out. Conventional extractors would not work as they dug into the soft brass. Their breakage in the hole would have made removal almost impossible so it was usually necessary to use the time-honored hammer and chisel method which made it necessary to keep badly needed equipment out of commission at critical times.

To obviate this, a drill guide bushing and broaching punch were made up in the shop. The guide bushing had a pin with a snug fit on the inside of the broken nipple. A collar on the guide was drilled with four 3/32-in. holes 90° apart on a radius ⅛-in. larger than that of the pin.

A square punch was made of chisel steel with the distance across the flats equal to the distance from outside to outside of two adjacent holes in the guide. The end of the punch



Flush-broken fittings in cramped locations can be removed by drilling four holes, broaching, and easy wrenching

was sharpened by filing two vee notches at right angles thus giving a sharp projection which matched the four pilot holes.

In use, the drill guide was inserted in the broken nipple and the four pilot holes were drilled with a small electric hand drill. The guide was removed and the punch, with each of the sharp corners resting on a hole, was driven in thus broaching a square hole. Removal of the nipple was then easily accomplished by turning the broaching punch with a wrench.

Although the device was made to be used with brass nipples it might also be used with mild steel studs and fittings. On thinner walled fittings a hex bar might be used with its end sharpened by three "V" notches and used without a pilot guide.

Crayon Marking Simplifies Gage Re-Inspection

CARL ASKERBLOOM
West Hartford, Conn.

There is never enough time at the end of a shift for the gage crib man to test all the incoming gages, but few shops can afford the time, space or cost of a large number of duplicates.

Many systems for ready identification of used gages have been tried, and in no case should all gages go untested any more than all should be reinspected without distinction between the used and the unused.

What we do is this: After testing each gage, its working surface is marked with a crayon when it is returned to its shelf. Then the crib man can tell quickly which gages have been let out and which have not, because usage will remove the crayon mark.

At the end of a shift all gages are returned to their regular places in the crib and any gage testing is done at the beginning of the next shift on whichever gages seem questionable.

NOW... $25 for the best Practical Idea in each issue

(in addition to regular payment for all exclusive contributions published)

Until further notice, an extra payment of $25 will be made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

Payment—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

Judges—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, will hereafter select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. The decision of the readers will be final in each case.

Requirements—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product — in terms of its usefulness to them.

Who May Enter—Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments.

How to Enter—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St., New York 18, N. Y.

Nineteenth Selection—W. C. Roemer's Rotary Bender

THE CLOSED SHOP

Key to Labor Monopoly

IF THE PEOPLE of the United States are to loosen the monopoly control now exercised by some segments of union labor and recapture the power to control their own economic and political destiny, they must come to grips with the problem of the closed shop. A satisfactory solution of that problem is as vital to the interests of the wage earner, who should be fully protected in his right to organize and bargain collectively through representatives of his own choosing, as it is vital to the interests of the nation as a whole.

By the closed shop, which unfortunately is a term that seems to shed more heat than light, I mean any shop in which the worker must make his peace with a union in order to have a job. There are approximately 13½ million union members in the United States. Of these about 10 million are governed by arrangements calling for "closed" shops, union shops, maintenance of membership provisions and similar devices which make good standing in a union a condition to holding a job.

Such arrangements raise serious issues about what is commonly presumed to be the basic American right to work. Also, closed shop arrangements lie at the root of the dominant economic power now exercised by some labor leaders.

The problem of reducing the power of these labor leaders to proportions that make it safe for democracy is the age-old problem of monopoly. In an earlier era this problem was created largely by businessmen who sought to escape the restraints of competition by combinations or agreements to control prices and production. Such efforts are still attempted and must be curbed by law.

Union Labor Monopoly

But, after more than a decade during which a monopoly position for organized labor has been aggressively promoted by the federal government, the major monopolists today are those labor leaders who wield the power of enormous nationwide unions. About 90% of the soft coal miners do the bidding of John L. Lewis. A like percentage of the auto workers are represented by the United Automobile Workers of the C. I. O. About 80% of the production workers in steel are members of the United Steel Workers, C. I. O. No single corporation has more than a fraction of the economic power that is concentrated in these unions. And if corporations were to combine their power to cope effectively with that of these union monopolies they would unquestionably find themselves charged with violating the federal antitrust laws.

In its national sweep, the monopoly power of unions rests largely on their exemption from the federal antitrust laws. My previous editorial in this series (the 53rd) discussed the desirability of removing that exemption. The local roots of this monopoly power are often embedded in closed shop arrangements.

Closed Shop in Coal

An illuminating case in point is provided by the United Mine Workers, whose leader John L. Lewis has graciously given the country a 3½-month reprieve from "the hysteria and frenzy of an economic crisis," as he himself termed it. During that latest crisis the dispatches from the soft coal fields reported that the miners were standing behind John L. Lewis almost to a man. And the implication usually was that the driving forces of the strike were loyalty to Lewis and the prospect of economic gain.

Underlying that performance, however, and basic to it was an agreement in the soft coal fields providing that "as a condition of employment all employees shall be members of the United Mine Workers." Hence to hold a job in 90% of the soft coal industry which is governed by contracts with the United Mine Workers, a miner must not offend the union. To avoid offense the union member must even be careful in criticising what his union

does. *Suspension from the union for six months, and hence from the right to hold a job,* is the penalty imposed by the United Mine Workers constitution for circulating a statement "wrongfully condemning any decision rendered by any officer of the organization."

The willingness of the miners to follow Lewis until the country froze over was not, of course, exclusively a product of the agreement limiting jobs in the coal fields to union members of good standing. Some of it originated in bad handling of employee relations in the coal fields in years gone by. But the fact remains that Lewis' soft coal monopoly has as one of its principal foundations an agreement which gives the United Mine Workers a job-or-no-job hold on 90% of the soft coal miners.

In its extreme form, the closed shop not only makes union membership a condition of employment but narrowly limits the numbers admitted to union membership and hence to the opportunity to work. In this way it is used to enforce restriction of output and working rules which would never stand up under free competition.

Fair Dealing

The closed shop raises major issues of personal freedom and fair dealing between individuals. As matters now stand, closed shop agreements require employers to discharge workers who lose their good standing in the unions involved. At the same time they frequently impose no requirement on unions to grant membership to law abiding and technically qualified persons. Many unions with closed shop agreements refuse to grant membership on the basis of competence. Thus, qualified workers are denied a fair chance to hold a job.

In its dealings with the closed shop issue the federal government has been pushed into a self-contradictory position. The National Labor Relations Act (the Wagner Act) provides, and properly, that "employees shall have the right . . . to bargain collectively through representatives of their own choosing." In furtherance of that basic proposition, the Wagner Act also provides that "It shall be an unfair labor practice for an employer . . . by discrimination in regard to hire or tenure of employment to encourage or discourage membership in any labor organization . . ." Standing alone, the provision would clearly outlaw the closed shop.

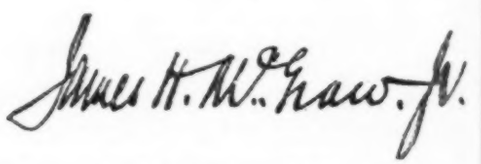
But then, to favor the closed shop, the Wagner Act turns right around and provides that "nothing in this Act . . . shall preclude an employer from making an agreement with a labor organization . . . to require, as a condition of employment, membership therein," provided that certain conditions of representation are fulfilled. This places the National Labor Relations Board in the impossible position of trying to administer a law which simultaneously points in opposite directions.

In successfully contending that there should be no closed shop arrangements on the railroads, the late Joseph Eastman, Federal Co-ordinator of Transportation, said, "If genuine freedom of choice is to be the basis of labor relations under the Railway Labor Act, as it should be, then the yellow dog contract and his corollary, the closed shop . . . have no place in the picture." The so-called yellow dog contract, which requires a worker to agree not to join a union as a condition of employment, has long since been outlawed.

At one time the closed shop was defended as a protective device for feeble young unions struggling against predatory employers. But a mere glance over the current economic scene discloses that the time when that argument was supported by the facts is past. Now it is the labor leaders who frequently exercise decisive economic power.

At elections in November three more states, Arizona, Nebraska and South Dakota, passed constitutional amendments outlawing the closed shop. In doing so, they joined six other states, which, in one way or another, have restricted the closed shop. The South Dakota amendment presented the basic issue created by the closed shop in simple and direct terms when it declared that "The right of persons to work shall not be denied or abridged on account of membership or non-membership in any labor union, or labor organization."

That issue must be squarely faced by the new Congress if its first order of business, the labor crisis, is to be resolved.



President McGraw-Hill Publishing Company, Inc.

NEWS OF METALWORKING

Capacity Steel Operations Seen Despite Recent Price Increases

PITTSBURGH—Pittsburgh steel executives remain convinced a strong demand will support capacity steel operations throughout 1947 irrespective of any recession that may occur in other segments of the economic front. This, despite the fact the wave of steel price advances has now been completed and there is evidence of a buyers' strike elsewhere.

Steel plants—in this district, at least—have started another run of 100% operations which, it is hoped, can be continued for some months without interruptions. What will happen in connection with labor negotiations now underway cannot be predicted and settlement without a strike is a hope, not a promise.

Steel is being supplied to customers mainly on quotas and there is not much use in seeking larger tonnages or from other sources.

There are going to be some wide extremes in prices of certain steel products as open market conditions become more recognized. One mill which will provide sheets to 25 cooperative owners will pay $66 for its sheet bars. This compares with $38 which ruled OPA and $50 under the government subsidy.

The sheet situation has some promise in the new capacity which will come in during the first half of the year but this will not satisfy all the demand. The additional steel which these mills will take will cut the allocations to other finished steel goods.

ALL QUIET ON DETROIT FRONT; WORK TURNOVER CONTINUES

DETROIT—The January labor picture in Detroit was comparatively serene. There were few strikes in the Detroit area and very few men invloved. Grievances are at a low ebb in nearly all shops. Turnover is still upsetting equilibrium, and efforts of many plants, particularly the big ones, to build their working forces are being negated every day by quits which equalize new hires.

In the background of this rather unusual peaceableness is the 23.5c demand of the CIO United Auto Workers Union, made on Chrysler formally in mid-January, scheduled for presentation later to General Motors and Ford, and handed to other companies meanwhile.

But the best Detroit opinion expects this demand will spin itself out into negotiations rather than strike action, at least for the period during which the United Steel Workers are attempting to set a nation-wide pattern in their negotiations.

Peak Levels for Farm Equipment Production Stir Sales Planning

CHICAGO—Farm equipment makers are indefinite about the precise timing, but they believe that sometime this year output will reach peak levels. Lloyd M. Sweeney of Massey-Harris Co. asserts that when that time comes, "you will see a flood of tractors, combines, and implements from the greatly enlarged factories of the industry that will far surpass anything we have seen in past years.

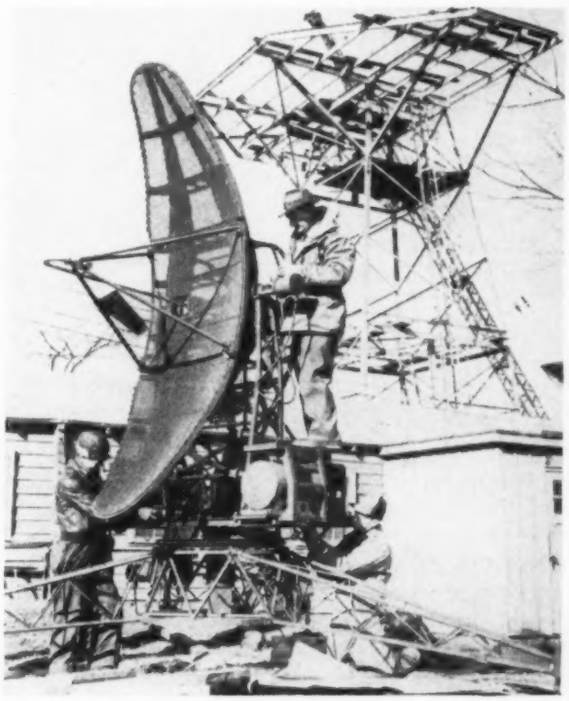
Although two units of the industry—Allis-Chalmers and J. I. Case—are still crippled by strikes, other companies in the business are already turning out goods at a record clip. But they art starting to worry about sales when competition gets tougher.

Obsolescence Being Preached

To keep up sales when the buyers' market starts, some of the farm equipment makers are taking a leaf from the machine tool industry's book. To sell a tractor to a farmer who already has an old tractor, they will show that the new models will save labor by cutting the time needed for plowing and other operations; that they will lower fuel bills; and that they will decrease repair costs. The story of obsolescence is being preached to the farmer.

If this new sales technique is successful, however, it will make tradeins one of the biggest headaches of dealers. Manufacturers are already warning their outlets that a flood of used equipment will be dumped in their laps as farmers replace their machines with new models more frequently than they have in the past.

Although the end of the sellers' market has been loudly predicted, most dealers still don't believe it. For that reason manufacturers are preaching inventory control. They don't want the return to normalcy heralded by a flood of bankrupt dealers. Producers are pointing to the hardware field as an example of inadequate inventory control. Already many retail hardware merchants are struggling to move top-



Airport Radar—Installation of radar equipment as a safety measure is being undertaken at several of the nation's larger airports. The altitude-finding section of the radar scanning system is shown being installed at Washington's National Airport where it will chart and control the approach of airplanes up to 200 mi. from the nation's capital

Gaging Business

New Machine Tool Sales Suffer

Sales of new machine tools would have been 50% higher than they have been recently were it not for stiff competition from low-priced surplus government-owned machine tools. The latest action of WAA in adding a second list of standard surplus machine tools to the low-price category intensifies this competition and makes sales of new machine tools even more difficult.

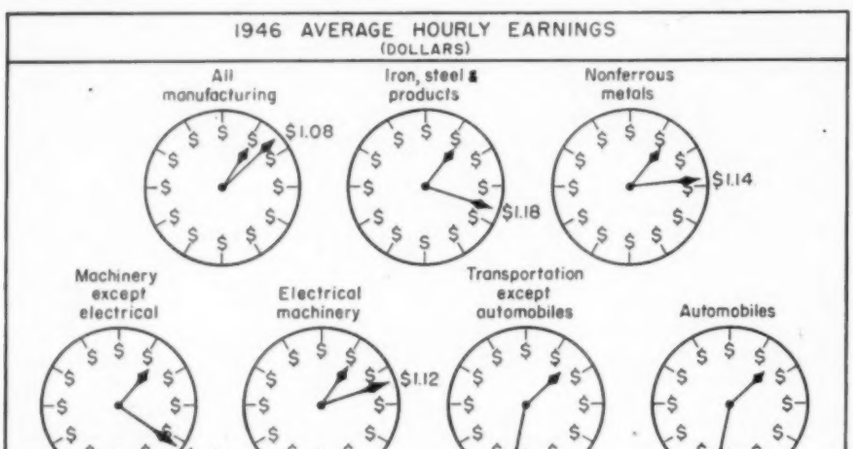
Sharp Disparity Between Builders

Never has there been a sharper disparity in sales volume of new machine tools between individual builders. While some companies report distressingly little fresh business, others are gratified at the relatively high level of orders. Sales in some cases are running well ahead of the same period a year ago.

Sales of $300 Million Expected

The machine tool industry in 1947 may do a business of $300 million which is only a fraction below the '46 dollar volume, but represents fewer machines because of higher prices today as against a year ago. Sizable purchases later in the year by the automotive industry, when retooling programs become active, will contribute to this year's business. Foreign sales should be at least 25% of the total, and probably more.

Builders are worried over the price-wage predicament. Though prices have gone up only 30% compared with prewar, labor costs are up 100% in some companies, and the industry faces demands for further increases. There may be no alternative but to raise prices, but that may have the effect of cutting sales because of buyer resistance.



1946
CALENDAR OF WEEKLY EARNINGS
(DOLLARS)

All manufacturing	Iron, steel & products	Nonferrous metals	Machinery except electrical	Electrical machinery	Transportation except automobiles	Automobiles
43.42	46.84	47.51	49.77	45.05	52.03	49.22

Source: Bureau of Labor Statistics, U.S. Department of Labor

1946 Wages—Average weekly and hourly earnings for the past year are shown in the above charts, as computed by *American Machinist*. As the year drew to a close, the average workweek was about 1 hr. shorter than a year earlier, while weekly earnings averaged about $45.50, reflecting the wage increases granted through union demands and after several paralyzing strikes

Steel Close To Peacetime Peak

Within a few weeks the country's raw steel production will hit an all-time peacetime high. If strikes do not interfere, this record rate will be maintained straight through the coming months. Output of sheet and strip steel, the most critical items of all, also are at a new peak. This has been made possible by new capacity which has recently been brought in and by reconversion of mills which made plate stock during the war. Steel mills are about to set up a quota system to see that railroad car builders get the steel necessary to meet production schedules.

Large Sums To Be Spent

A survey of midwestern metalworking firms reveals that greater sums will be spent for expansion this year than last. International Harvester plans a $100 million program, against $60 million in 1946. Caterpillar Tractor intends to double its '46 expenditure of $10 millions. Servel, Inc. made an outlay of $5 million for expansion last year and will spend a like amount this year. Minneapolis-Honeywell has a $2 million program for 1947, or twice the sum expended last year. General American Transportation will spend $2 million.

Postwar Appliance Models

Home appliance makers are getting into production of true postwar models this year. Chicago area manufacturers as well as those in the East are tooled up to turn out a variety of genuinely new models. They include radically-designed automatic washing machines, home electric irons, automatic wall washers and rotary venetian blind cleaners. Radio set manufacturers are working full speed and are having trouble pushing production above levels already achieved. Those levels are above prewar rates.

Plastic Equipment Makers Busy

Makers of plastic working equipment still have huge backlogs. This is particularly true of builders of injection molding machines. Two trends point to broadening markets. The first involves reduced prices of press equipment—always considered high by users. The second aims at coping with high costs of tools for plastic molding and die-casting. The latter trend has prevented many metalworking companies from setting up their own departments, even when considered desirable.

12% Discount Offered By WAA On Surplus Machines For Resale

WASHINGTON — War Assets Administration shortly will put into effect a discount of 12½% to all contract dealers and exporters who purchase surplus machine tools for resale. Rebuilders who are not contract dealers are eligible for this discount. A certification must accompany each order saying that the machine is being purchased for resale.

There will be no ceiling placed on the resale price when the buyer resells a machine. He may, in fact, hold it for later rebuilding. The only stipulation is that he must not sell it below the price established by the government for surplus machines. One dealer can buy for another dealer and get discount, provided he uses his own money.

Commissions Retained

The new arrangement does not interfere with the arrangement in effect since January, 1946, whereby contract dealers acting as sales agents for machine tool purchasers receive a 12½% commission on sales. Foreign dealers with offices in this country may buy surplus machines at the 12½% discount through their U. S. offices. WAA is not authorized to make sales outside this country.

WAA intends to screen contract dealers to eliminate those who are not doing a real selling job and those who are a constant source of friction in doing business. A review committee will give a hearing to any contract dealer who voices objection to his elimination. No new contract dealers will be licensed from now on, as ample time had been allotted to everyone who wished to apply.

NMBTA Reports 1946 Shipments of Machine Tools at $325 Million

CLEVELAND—Machine tool shipments for 1946 totaled $325 million according to figures compiled in the offices of the National Machine Tool Builders Association, Cleveland, bettering by $15 million the figure predicted for the year at the start of 1946.

Monthly figures (estimated with about 90% of the members of the association reporting) for December show new orders placed during the month dropped to $18 million as compared to $19,200,000 for November.

Shipments held up well, according to the National Machine Tool Builders Association statistical reports. For the entire industry an estimated $27 million in shipment were made during December of which $24,500,000 was from member companies. These figures compare with the $26,176,000 in shipments by the industry in November with member companies shipping $23,820,000 of the total.

Cancellations for December totaled $1,700,000 as compared to $1,344,000 in November with backlog of unfilled orders in December being reduced to $161 million as compared to the $170,127,000 in November.

West Coast Machine Tool Sales To Rise With Expansion Plans

SAN FRANCISCO—Machine tool distributors in the area aren't happy. That is, when you talk about today's business. They can sell more than they can deliver in many types of machine tools and delivery dates promised by eastern manufacturers are far in the future. This is especially true in milling machines, 2's and 3's; punch presses of 20 tons and up; small shears and brakes, 10 gage and under; bench grinders, 1 hp. and under; and all sizes of automatic screw machines.

In spite of these conditions, sales of machine tools here are running above 1945 figures.

Millions of dollars are now being spent on new plant construction from San Diego to Seattle and more millions on expansion of existing industries. Assured future development, as indicated by industrial property purchased and plans announced, will measurably add to this expenditure. Rumors involving still secret western developments complete the picture which makes the tool men happy. Most projects will mean the installation of machine tools.

There have been no known closings of metalworking shops since V-J Day. On the contrary, they are all busy as far as material shortages will permit, with new ones starting, especially in the smaller towns.

In supplying these new and expanded machine shops, the tool distributors point out an interesting fact. Where shop owners before the war would buy a second-hand machine costing in the hundreds of dollars, they now are not satisfied unless they have a new one in the thousands-of-dollars bracket. Reason for this is that, during the war, they were furnished by the government with the best equipment possible and they came to realize the increased and efficient production made possible by their use. About the only items of second-hand machinery moving now, regardless of age, are electric motors, which are scarce Even some of the new tools are being delivered without them.

Also bright on the horizon is the fact that there is western capital willing and ready to go into business making tools. With freight rates and delivery dates what they are, and potential market looming as it does, it is only natural that this should happen. The only alternative is for present eastern manufacturers to set up western plants.

Financial circles supporting the establishment of machine tool producers here are not unmindful of the Pacific export market. Mexico, Central America, Hawaii, China, the Philippines, Australia and other countries now are buying in small volume and are expected to increase their purchases greatly when their economies are stabilized. Although Australia, under orders to "Buy British," will undoubtedly drop out, Japan eventually will come in.

BACKLOGS CONTINUE TO RISE FOR PLATES AND SHAPES

PITTSBURGH—Prospects of improvement in supply of shapes and plates and reinforcing bars must wait for some indication of balance in general steel supply and demand situation. Quotas of semi-finished steel to such mills will be held down as long as other finishing mills can utilize bulk of tonnage.

Little progress will be made in reducing backlogs of these products for some time.

Carbon bar backlog is heavy and, particularly on small sizes, production will be substantial.

Wage Contract Extension Request Nettles Cleveland Fabricators

CLEVELAND — Steel fabricating companies in the Cleveland area are being asked formally by the United Steelworkers of America, CIO, to extend the existing wage contracts until new agreements can be negotiated with the basic steel industries. A poll of several Cleveland fabricators showed such letters had been received.

Those who have replied have taken a strong stand against the past practice of shoving on to the fabricator the wage rates agreed to between labor and the basic steel producers without the fabricators having a semblance of representation.

Paralyzing Strikes for 1947 Dim Under Changed Attitude of Labor

NEW YORK—Can industry schedule production without fear of major steel, automotive, and electrical manufacturing strikes? What are the possibilities of industrial managements and unions working out contracts by collective bargaining? What will be the cost, in higher wages, of a labor peace?

▸ Executives in metal trades and other industrial fields have spent several months worrying about the answers to those questions, vital to continued progress of industry toward high productivity and a sound business economy. Definite answers are now being written in conferences under way in Pittsburgh and Detroit, and in preliminary skirmishes in electrical manufacturing centers. While it still is too early to tell just what the answers will be, unless present signs are deceptive they will bear out a rising optimism.

▸ There is no doubt that 1947 will bring strikes, many strikes, but barring unforseen developments they will not approach the wave of 1946 stoppages in magnitude or seriousness.

Strike Threats Lessen

There is a much better than even chance that paralyzing steel, automotive, and electrical manufacturing strikes will be avoided this year. Steel management and labor entered 1947 contract negotiations recently with an apparently sincere willingness to bargain to some agreement. There has been a similar attitude indicated in the automotive industry and in electrical manufacturing, although in the latter labor and management positions so far seem widely divided. There may be a scattering of minor strikes, but prospects are good for escaping a new series of big, national tieups.

Free Prices Helpful

The outlook is that collective bargaining, and not the economic pressure of strikes, will lead to the final drafting of most of this year's contracts.

▸ For one thing—and it is a major factor—management is no longer shackled by rigid price ceilings. It can adjust its charges to customers to offset any increased labor costs. Strikes in 1946 were just as much price strikes as wage strikes; management had no incentive to settle with its unions for a pay boost until it had assurance that pricing relief would permit continued profitable operation. That condition does not exist this year. Hence management can be expected to make a far greater effort this year for peaceful settlement of union contract demands.

Union Belligerency Ebbs

Nor are the unions as belligerent this year. There have been significant predictions from labor leaders, including the top hierarchy in CIO, that 1947 contract demands can be negotiated, and that there need be no major labor disruptions. That indicates an obvious willingness to give ground from original bargaining demands.

▸ Last year the accumulated grievances of the war period and sudden removal of the tension of military production set the stage for mass strikes. Workers' pent-up steam of job dissatisfaction blew up the moment their leaders lifted the no-strike lid. However, the resulting spread of strikes was more extensive and more prolonged than workers or unions had expected.

Strike Funds Depleted

This year the workers' reserves are smaller, and unions are not nearly as well fortified with strike funds (CIO's United Auto Workers, for example, has been hardpressed to meet the costs of its Allis-Chalmers Mfg. Co. strike for the past 10 months.)

▸ These facts, alone, would not deter the unions from a strike if bargaining should reach a stalemate. Labor's leaders could still call—and maintain—new and costly strikes to win a union objective. The fact that they do not want to strike is not a sign of weakness, nor should it be too quickly interpreted as a growth of high labor statesmanship and a recognition of union responsibility. Rather, it's a matter of strategy.

Threatened Legislation Softens

The new Congress—not as anti-labor as generally believed—will not pass legislation this year which will too strictly limit labor's program, unless it is stampeded into doing so by new and serious strikes. Some labor restrictions can be expected, without doubt, but not the all-out bars which are being urged by a small group—so far—of extremists headed by Sen. Joseph Ball. The moderates, with their eyes on 1948, have the upper hand currently in Republican labor law policy-making.

▸ Labor's leaders want to see that no impetus is given to demands for sweeping union regulations. As they see it, the best insurance against labor laws is a demonstration that collective bargaining can work successfully if management and labor are left alone to work out their differences at the negotiating table.

PROSPECTIVE LABOR FORCE CHANGES, BY STATE
1940-1950
INCREASE 10% OR MORE
INCREASE 4-10%
LESS THAN 4% OR EITHER DIRECTION
DECREASE 4% OR MORE
LABOR FORCE INCLUDES ALL PERSONS 14 YEARS OF AGE AND OVER WHO ARE WORKING OR SEEKING WORK

Labor Force Expansion—The decade from 1940-1950 is expected to show a net increase of 7 million workers, according to predictions of the U. S. Department of Labor. Although 4 million below the peak wartime labor force, it is expected that employment will show an increase from 1940's 55 million to 62 million in 1950. Natural population growth and the increased number of women workers are two main factors responsible for this increase. Wartime industrial expansion is largely responsible for geographical shifts indicated in the above map

Detroit

BULK OF TOOLING ORDERS EXPECTED IN MARCH . . . ENGINE AND MECHANICAL CHANGES LOOM . . . INVENTORIES PARED TOWARD BALANCE

1948 Tool Orders Lag

Very little ordering on 1948 auto model programs has appeared in the books of the machine tool makers. As is customary, some of the major machines have been started into manufacture, but trade expectations are that the bulk of commitments will not appear before spring.

▸ The signs point to fairly good-sized orders being placed by nearly all car companies. Ford, for example, has announced that its 1948 models, to be sold at lower prices than the 1946-47 counterparts, will embody definite major changes. Cadillac and Buick have large-sized programs on tap, even though the other G. M. divisions (Chevrolet, Pontiac, and Olds) have cut back their plans, as reported earlier. Chrysler, too, has some interesting changes in mind.

New Motor Line Planned

Packard will shortly be involved in a program whose end-result is expected to be a complete new motor line, and Hudson and Nash have notable changes in mind. At Studebaker, largest of the independents, this general industry pattern does not hold true, inasmuch as the South Bend company made its big modification on its current models, but, even so, engine and mechanical changes may come forth late in the year from that point.

▸ Of the Chevrolet light car much is being heard, but thus far it is strictly in the rumor stage. No formal go-ahead has been given by the corporation on this project, which was postponed about four months ago for an indefinite period. But some suppliers have been given to understand that a reinstatement of the postponement might come along almost any day.

Tooling Work Declines

Activity in the Detroit area's tooling shops, meanwhile, is gradually reducing. Recent cancellation of the major 1948 Chevrolet-Pontiac-Olds tooling programs had no immediate effect of consequence, but ever since that event, late in November, payrolls have been steadily diminishing. Indications are that employment reduced around 15% during December and January. No change of consequence, however, seems to have appeared in work schedules; all shops are maintaining about the same amount of hourly time operated during the latter part of 1946.

▸ Materials are no more available today than they were a few months ago. In fact, they may diminsh a little bit in the near term as the effects of the coal strike catch up with steel shipments.

Raw Stocks Insufficient

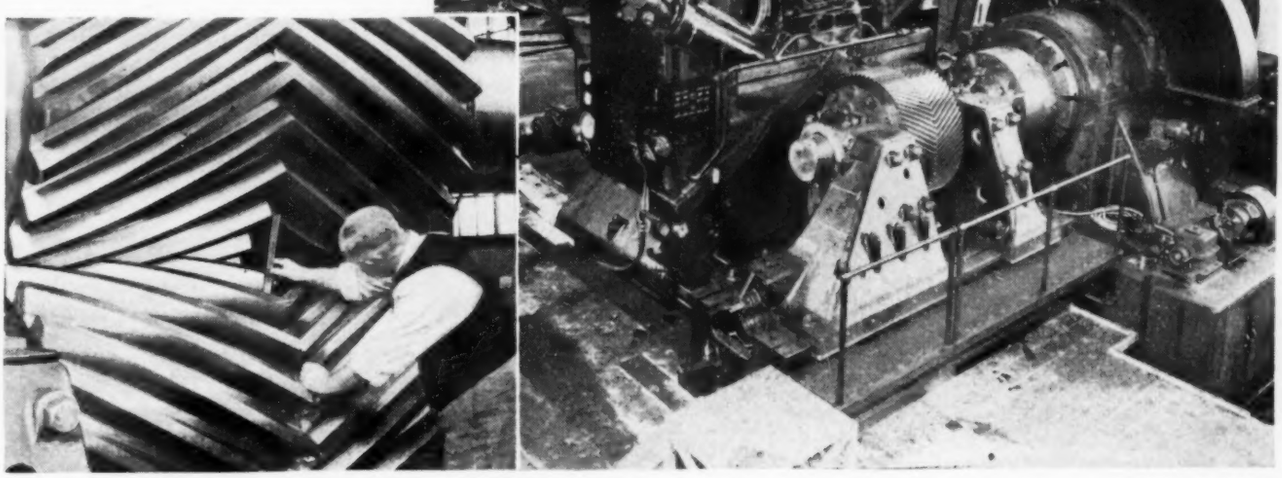
Lack of sufficient quantities of raw stocks is the basic reason behind first-quarter manufacturing schedules which are around 5% below the projections for the fourth 1946 quarter. After the first quarter passes, the picture is expected to improve, but not before then.

▸ This situation is spelled out rather well by a recent analysis of the Automotive & Aviation Parts Manufacturers, Inc., concluding that 5 million cars and trucks can be built in 1947 only by cutting replacement parts output 30%. If 4 million vehicles are built, this finding goes, replacement parts cutbacks will have to be around 13%. As the parts people see it, there simply won't be enough materials to meet all needs.

Inventories Pared

One result of the situation has been to pare down inventories toward balance. All companies let their stockpiles get far out of balance during the middle and toward the end of 1946—as evidenced by record-high inventory values shown on nearly all financial statements, in company with inability to get rolling on production due to shortages.

▸ One firm issued terse orders to its people to find out what its bottleneck inventory items are, then boil down the others to that level. The result of this tendency has been a heavy curtailment in the past few months of standing orders and releases for goods in ready supply.



Largest Pitch Pinions—Dominion Engineering Works Ltd. of Montreal recently completed a pair of gears with a larger pitch than any previously made by generating. The gears are a set of 44-in. Blooming Mill pinions, having 6.283-in. CP., 1/2 D.P., 22 teeth, 3.6-in. throat depth, 66-in. face, and 17 ft., 10 in. over-all length. A generator of the planer-type, designed by Dominion, was used. It differs from conventional types in that cutters are hydraulically operated by 2 cylinders at 120° included angle. Each pinion was cut in 280 hr., a marked time saving

1400 Surplus War Plants Costing $4 Billion Sold or Leased

DISPOSAL OF SURPLUS WAR PLANTS
Up to Oct. 28, 1946
(Plants Costing $5 Million or More)

Plant & Location	Total Cost	Sale Price	Purchaser
Lowell Ordnance Plant Lowell, Mass.	*5,167,000	2,200,000	General Electric
United Aircraft E. Longmeadow, Mass.	*42,992,000	1,750,000	Package Machinery Co.
Wright Aero. Corp. Woodridge, N. J.	*32,246,000	13,000,000	Wright Aero. Corp.
Curtiss Wright Cheektowaga, N. Y.	18,134,000	9,600,000	Westinghouse Co.
General Electric Syracuse, N. Y.	8,108,000	4,000,000	The Carrier Co.
Jones & Laughlin St. Lawrence, N. Y.	7,029,000	4,000,000	Jones & Laughlin
Remington Rand Binghamton, N. Y.	5,060,000	2,250,000	Remington Rand
Aluminum Co. of America Burlington, N. J.	8,182,000	30,000	Neidich Cel-lus-tra Corp.
Aluminum Co. of America Cressona, Pa.	10,750,000	6,500,000	Aluminum Co. of America
Reynolds Alloys Co. Lister Hill, Ala.	20,767,000	7,000,000	Reynolds Alloys Co.
Curtiss-Wright Indianapolis, Ind.	6,220,000	2,620,000	Eli Lilly & Co. Stokely Foods
General Motors Melrose Park, Ill.	20,823,000	13,750,000	International Harvester
Revere Copper Inc. Chicago, Ill.	10,688,000	3,500,000	Garrett Metals Corp.
General Electric Fort Wayne, Ind.	9,207,000	5,000,000	General Electric
Allis Chalmers Co. W. Allis, Wis.	5,315,000	3,700,000	General Electric X-ray Corp.
Chase Brass & Copper Co. Cleveland, O.	*18,248,000	5,013,000	Chase Brass & Copper Co.
Thompson Aircraft Euclid, O.	14,816,000	5,000,000	Thompson Aircraft
Carnegie Ill. Steel Duquesne, Pa.	10,859,000	6,518,000	Carnegie Ill. Steel
Carnegie Ill. Steel Homestead, Pa.	*86,539,000	44,032,000	Carnegie Ill. Steel
Carnegie Ill. Steel Braddock, Pa.	*22,783,000	14,443,000	Carnegie Ill. Steel
Aluminum Co. of America Monroe, Mich.	6,203,000	2,450,000	Kelsey Hayes Wheel Co.
Bendix Aviation Wayne, Mich.	*7,130,000	1,157,000	Gar Wood
Ford River Rouge Plant Dearborn, Mich.	19,352,000	1,414,000	Ford Motor Co.
Leister Kauffmen Louisville, Ky.	9,159,000	6,700,000	International Harvester
Aluminum Co. of America E. St. Louis, Ill.	12,491,000	2,100,000	Earl P. Halliburton
Republic Aviation Evansville, Ind.	9,373,000	5,648,000	International Harvester
Pennsylvania Shipyards Beaumont, Tex.	5,779,000	750,000	Penn. Shipyards
Columbia Steel Co. Geneva, Utah	*200,585,000	47,500,000	United States Steel
Consolidated Vultee San Diego, Calif.	11,314,000	2,160,000	Multiple tenancy
Douglas Aircraft Santa Monica, Calif.	5.804,000	3,750,000	Douglas Aircraft
Lockheed Burbank, Calif.	*8,238,000	5,508,000	Lockheed
Lockheed Burbank, Calif.	*6,524,000	3,847,000	Lockheed General Panel Co.
Bethlehem Steel Bethlehem, Pa.	6,539,000	6,539,000	Bethlehem Steel

*Including equipment.

WAA reveals 800 plants costing $6 billion remain on its hands. Many leased sites will return to Government; others cannot be adapted to peacetime uses

WASHINGTON—Close examination of available data on surplus disposal reveals the Government has disposed of about 1400 surplus war plants costing $4 billion, with about 800 plants, costing $6 billion, still on hand.

In units, the job is more than half done, but dollar-wise it's still more than half-way to a closeout. A final closeout will never come because many unsold plants are unsuitable to peacetime industry.

These figures are close, but not exact because a few records of War Assets Administration's predecessors are not available. One lot of 219 plants is not included because they were leased on interim short terms and many may be returned to WAA's inventory. The Government eventually will repossess an unpredictable number of the leased installations.

A vast amount of real property in the surplus catalog is air bases, training camps, relocation centers, docks, shipyards, and other establishments so located as to have little peacetime adaptability.

Low Recoveries Admitted

Of the disposed totals, WAA sold, leased, or transferred—from March 25, 1946, to the year-end—790 plants, valued at $2,559,501,115. WAA shies away from publicity on percentage of recovery on the ground war-time costs were exorbitant and makes the sale figures appear low. Calculating on the basis of current "fair value," WAA officials claim over 100% recovery on a few installations, but admit low percentages on others.

RFC, a WAA predecessor, reports sale of 84 plants, and leasing of 203 as of Nov. 30, 1945. Of the 84 sold, calculations on 66 showed an average recovery of 70% of actual war cost. But most of these were sold to operators who had purchase options, and would have built them anyway.

1946 Dispositions Small

Majority of WAA's 1946 dispositions were small, averaging $3 million (cost), including an average of $300,000 (cost) worth of equipment.

Biggest deal was Geneva steel plant, Utah, sold to United States Steel for $47 million cash. But lease of the Dodge Chrysler plant at Chicago to Tucker Corp. seemed likely to make more jobs, perhaps 35,000.

Big business bought or leased only 24% of 1946 dispositions, nearly all units costing more than $5 million which could not be used by small operators. Large operators don't want little plants, and little operators can't use the big ones—except on multiple-tenancy arrangements, which are not easy to organize and maintain.

Fear Justice Dept. Veto

WAA says many big companies do not even apply for properties because they fear a turn-down by the anti-trust division of the Justice Department. Justice says it does not pre-judge the effect of a proposed plant acquisition. It can only go into court with accomplished facts. But it can and does advise with prospective purchasers who want to make sure they're in the clear.

Justice admits that firms who might negotiate for surplus installations hesitate because they don't want to remind Justice they are bordering on control in their fields. Instead, they can quietly build new plants, hoping not to be noticed—for awhile.

WAA's Future Status

Criticism of WAA for not moving more real property got into the press, but was not discussed in the House Surplus Property Committee. The Committee's tenure expired Dec. 31, and it has not yet been reinstated. Spokesmen for the old Committee say they do not believe plant disposal will be taken away from WAA.

However, the administration of WAA plant leases, some as long as 20 years, and custody of undisposed plants will require continuation of certain WAA functions for a long time, or their transfer to some new or permanent agency.

Conservatives in Congress are acutely aware of enormous square footage of leased and undisposed plants, and of the possibility that a future New Deal might use it for government production in times of depression, and they may try to do something about it.

Editor's note: The figures shown are the latest available in the records on file at the War Assets Administration. A second listing of plants sold or leased and costing from $2,000,000-$5,000,000 of interest to the metalworking industries, will be presented in the next issue of American Machinist.

COMMERCIAL LEASES UP TO OCT. 28, 1946

(Plants Costing $5 Million or More)

Plant	Lessee	Cost of Facilities	Term
Bell Aircraft Buffalo, N. Y.	John M. Henesey Bell Aircraft	$13,696,000	5 years
Republic Aviation Farmingdale, N. Y.	Republic Aviation	11,132,000	5 years
Sperry Gyroscope Lake Success, N. Y.	Sperry & United Nations	19,039,000	3 years
E. Budd Mfg., Co. Bustleton, Pa.	E. Budd Mfg. Co.	12,696,000	5 years
Aluminum Co. of Amer. Newark, O.	Reynolds Metals Co.	23,181,000	5 years
Aluminum Co. of Amer. McCook, Ill.	Reynolds Metals Co.	*27,035,000	5 years
Chrysler Corp. Chicago, Ill.	Tucker Corp.	*170,947,000	5 years
Studebaker Corp. Chicago, Ill.	Western Electric	6,662,000	5 years
Jack & Heintz Bedford, O	Jack & Heintz	*12,234,000	5 years
United Eng. & Fndry Co. New Castle, Pa.	United Eng. & Fndry Co.	*25,160,000	3 years
Bohn Alum. Co. Adrian, Mich.	Bohn Alum. Co.	13,734,000	10 years
Continental Avia. Muskegon, Mich.	Continental Avia.	7,675,000	1 year
Extruded Metals Corp. Grand Rapids, Mich.	Reynolds Metals Co.	6,730,000	7 years
Willow Run Bomber Plt. Ypsilanti, Mich.	Kaiser-Frazer	27,500,000	5 years
Granite Steel Granite City, Ill.	Granite City Steel	*12,697,000	5 years
Illinois Ordnance Plt. Carbondale, Ill.	Southern Illinois, Inc.	36,095,000	5 years
Republic Aviation Evansville, Ind.	Emerson Elec. Mfg. Co.	9,373,000	9½ years
Higgins Aircraft New Orleans, La.	Higgins Aircraft	23,595,000	5 years
Alum. Co. of Amer. Hurricane Creek, Ark.	Reynolds Metals Co.	39,000,000	5 years
Alum. Co. of Amer. Melvern, Ark.	Rrynolds Metals Co.	28,881,000	5 years
Lone Star Steel Co. Harris, Tex.	Lone Star Steel Co.	24,214,000	7½ months
Alum. Co. of Amer. Spokane, Wash.	Kaiser-Frazer Co.	*48,376,000	5 years
Alum. Co. of Amer. Troutdale, Ore.	Reynolds Metals Co.	*18,898,000	5 years
Alum. Co. of Amer. Phoenix, Ariz.	Reynolds Metals Co.	*34,818,000	5 years
Bohn Alum. Corp. Los Angeles, Calif.	Harvey Machine Co.	*8,205,000	5 years

Including equipment.

Priorities Limited To 3 Groups

WASHINGTON—The last remnants of the wartime priority system were virtually wiped out by the Office of Temporary Controls early this month. The amendment to Priorities Regulation 28 now limits issuance of the CC rating to three types of cases:

1—Items needed to fill military orders which cannot be deferred without hurt to the defense program or to health and welfare of enlisted personnel.

2—Items needed to provide essential utility services or, in emergencies, to eliminate serious hazard to life, health and safety of a large group of people.

3—Material and equipment required to maintain or increase production of building materials in short supply.

The net result of this amendment is the scrapping of all priority aid to business for production materials, maintenance and repair, and capital equipment of construction materials needed to start or maintain an individual plant or business or to alleviate individual hardship.

White Attacks Industry's Hidden Cost At Materials-Handling Exposition

CLEVELAND—The first National Materials-Handling Exposition, January 14-17, highlighted advances in the movement of materials in the iron and steel, aircraft, automotive, electrical and other industries.

▸ Endorsed by the American Warehousemen's, Lift Trucks and Portable Elevators, Caster and Floor Truck Manufacturers and the Electrical Industrial Truck Associations and the Materials Handling Institute, the exposition furnished the first opportunity for production and distribution executives to see under one roof all methods of handling.

Forum Discussions Held

Held concurrently with the exposition, the Conference on Materials Handling provided forum discussions led by executives drawn from a cross-section of industry. Speaking on the significance of industry's hidden cost—materials handling—C. M. White, President, Republic Steel, stressed our lack of real knowledge of such costs.

▸ "Too seldom," he emphasized, "we advance our thinking as it concerns materials handling from the receiving platform, where the materials arrive in the form of raw materials, to the shipping platform which they leave in the form of finished products. To most of us, materials handling in the plant is a necessary but costly and laborious job.

▸ "We forget that much of our total manufacturing procedure is based on materials handling . . . But we don't pay any freight bills for this interior handling, so too often we have no idea what it costs. It remains a hidden charge against total manufacturing costs."

"Muscle Power" Cited

Discussing materials handling in the automotive industry, N. M. Loney, Director, Works Engineering, Fisher Body, emphasized packaging in that its design should aim for the largest packages feasible according to the nature of the material, manageable bulk and maximum density so as to permit the maximum use of mechanical power in place of manual handling.

▸ Keynoting the conference, Ezra W. Clark, Vice President of Clark Tructractor, and chairman of the program committee of the exposition, compared horsepower to muscle power in modern production. "Mass production," he said, "pours an increasing volume of raw material, processed commodities, semi-finished products into the factory. This imposes greater burdens of weight and hours of labor upon the worker. . . . It takes two decades to grow a man. How can we make men quicker and stronger? Give the worker mechanical horsepower. Unite brain power with muscle power through a machine and thus create manpower."

8,000 View Exhibits

Nearly 8,000 visitors viewed materials-handling equipment exhibited by 116 manufacturers and distributors. Shown for the first time were many new items aimed at the reduction of back-breaking labor.

▸ Clark Tructractor introduced its new Pul-Pac attachment, designed to eliminate the need for conventional pallets in building and handling unit loads. A single sheet of corrugated or fiber board substitutes for the pallet. Unit loads are pulled on the solid sheet carrying platform by a grab on the bottom of a moving gate, the grab clamping over a protruding edge of the corrugated or fiber board. In unloading, loads are pushed off by the gate.

▸ Crescent Truck showed its new 1,000 and 2,000 lb. electric Palletiers, featuring pneumatic or solid tires, short turning radius and cam action travel control with a magnetic contactor in the line circuit. Ross Carrier introduced its new fork truck (air or water-cooled engine) with twin-hoist and twin-tilt units and unobstructed vision through the tower. Transitier Truck exhibited its streamlined Transitier, powered by the 26.5 hp. Crosley "Cobra" engine. Truck-Man, Inc., demonstrated ready maneuverability of its gasoline-powered Model D. Also demonstrated were latest models by Elwell Parker, Automatic, Towmotor, Mercury, Baker, Hyster, Lewis-Shepard, Vaughan, Yale & Towne and Salsbury Motors.

Motorized Trucks Shown

A wide variety of motorized hand trucks were exhibited, among them those by Automatic, Barrett Cravens, Lewis-Shepard, Lift Trucks, Inc., and Moto-Lift. Mercury introduced a 1,000-lb. aluminum hand truck, weighing only 175 lb. as compared to a probable 450 lb. for a comparable one made of iron and steel.

▸ Many new and redesigned pallets attracted considerable attention. Fab-Weld Corp. featured a welded steel pallet built up of crossed channels giving a virtual I-beam construction. Union Metal Mfg. Co. introduced its new knock-down steel pallet box, designed for inter-plant shipments.

▸ Among the relatively few conveyors shown, Bosworth Engineering Co. featured a booster belt conveyor having a full length (12 or 18 ft.) aluminum extrusion for its frame. Rapids-Standard displayed a variety of conveyors in a working exhibit.

Steel Scrap Disposal—A unique and economical method of collecting scrap around a plant is shown here. A tilting dump body mounted on an ordinary four-wheel truck picks up the scrap. When full, a fork truck picks up the truck and scrap which is then carried to a truck trainer for dumping. This plan is used by Edward Valves, Inc., East Chicago, Ind.

Washington

MORE SURPLUS MACHINES AT "FIXED PRICES"... LATIN-AMERICAN MARKETS DRAW INTEREST... TARIFFS STUDIED

27 More Types of Machine Tools Added to WAA Fixed Price List

Twenty-seven types, covering 247 models of surplus machine tools, formerly sold under the Clayton formula, have been transferred by War Assets Administration to its fixed price register, effective January 15. A catalog has been issued for WAA field offices, to be followed by a more compact version for the trade.

This second allocation of surplus tools for sale at fixed prices based on current value totals about $350,000,000, which is about the same as the first allocation last Oct. 28—making $700,000,000 in all. The balance of about $300,000,000 is still under the Clayton formula, a price scale based on age of the machines.

Final Price Reduction

Fixed prices are considerably lower than the Clayton prices. Some members of the industry have been concerned lest WAA further reduce its fixed prices. Apparently in reply to them, the agency now emphasizes that these reductions are final. It adds that tools now listed in the fixed price register will be held at those prices until they are sold.

Since Nov. 1, three days after the fixed-price sale began, sales of machine tools have increased 300 to 500% over rates of sales under the Clayton formula, according to WAA.

Among the 247 models added to the fixed price register are boring machines, spur gear grinders, external helical gears, gear tooth lappers, external and internal rotary type gear tooth shavers, Cam-O-Matic semi-automatic cam grinders, spline and gear grinders, production and speed lathes.

WAA spokesmen report that surplus machines, purchased by manufacturers and reconditioned for resale with a guarantee, are much desired because of the well-aged castings.

Machine Types Listed

Types of machines listed in contents table of War Assets new fixed price register, effective January 15:

Bench, floor and snag grinders
Boring Machines, horizontal, precision, bridge type, single and double end
Chucking Machines, automatic, vertical, multiple spindle
Chucking Machines, single and multiple spindle, horizontal automatics
Drilling Machines or Press Drills, bench or floor, single or multiple, deep hole, back spot facing; multiple spindle automatic
Forging Machinery and Hammers, impact stamping type
Gear Cutting Machines for straight bevel gears
Gear Hobbers, horizontal
Gear Hobbers, vertical, plain and universal gear and spline hobbing
Gear Shapers, external and internal spur and helical
Gear Tooth Shaver, external, internal gears, rotary type
Gear Tooth Shavers, rack or rotary, external or internal
Gear Tooth Grinders, generating types, spur and helical, external, internal
Gear Tooth Lappers, external and/or internal
Grinders, centerless; crank pin; cylindrical external; internal cylindrical automatic; hydraulic feed internal cylindrical; same for hole and face grinding; miscellaneous, spline and radius; plain external cylindrical; surface rotary table
Lapping Machines, flat, cylindrical and combination, gear tooth types
Lathes, production, between centers automatic, horizontal single spindle
Milling Machines, automatic and manufacturing knee type; bed type, horizontal spindle, plain or rise and fall; profile; miscellaneous slot millers; spline millers; spar millers and routers; bed type, vertical and angular head; vertical knee type except bench models
Planers, double housing
Polishing and Buffing, bench and floor
Profiling Machines and Duplicators
Screw Machines, single and multiple spindle, bar type automatic
Shapers and Slotters, vertical mechanical or hydraulic
Speed Lathes, all types and sizes
Tapping Machines, vertical, single or multiple spindle
Thread Grinders
Thread Millers
Tool and Cutter Grinders
Turret Lathes, ram type, plain and universal

Action on Underground Plants Awaits Report on Army Survey

The Army's "Underground Site Board" will report soon to Army-Navy Munitions Board its findings in a survey of caverns and abandoned mines in which war plants could be safe from atomic bomb attack. Few suitable ready-made cavities will be found, since minimum floor size is 30,000 sq. ft., and they must be near transportation. If the armed forces decide for extensive underground production, result will be huge excavating of plant space.

Underground Plants Voluntary

Right now, the Munitions Board says it will not "order" manufacturers to bury their plants—except single suppliers of strategic products. Even in such cases, the company could decline and the Government would build the plant and rent to an operator. Reports from Sweden *(see AM, Dec. 5, 1946, p. 160b)*, which buried many war plants, indicated excavated sites cost only 15% more than surface construction, and maintenance is cheaper, because no heating is required and weather protection, fences, etc., are eliminated.

Plan Raises Questions

Subterranean war production would be an enormous undertaking, however, affecting nearly all ordnance and many other industries. Big question: would operators go below permanently, or would they stay on top in peacetime? Would there be two war industrial plant systems, or would the surface works be abandoned for the most part? These are questions yet to be answered.

South American Markets

European countries are moving strongly into the South American markets with machinery and equipment. One example is Italian steam boilers selling in Argentina for 40% of U. S. prices. The boilers are made of American steel bought here by Italian firms which are supposed to be out of business.

Another example is Lockheed P-80 jet fighter planes. The Argentine Air Minister likes the planes but he is incensed at the American policy toward Argentina, and believes he can get just as good machines from the British.

U. S. Cooperation Urged

Strong factions in the U. S. Congress want to cooperate with Argentina, forgetting our anti-Fascist feelings in the interest of American exports. They feel that footholds gained by European manufacturers in the Argentine will be expanded in other Latin American countries and that many U. S. products will be frozen out for a generation.

Import Privileges Sought

Some Congressmen are agitating against further reduction of U. S. import tariffs which will let in great volumes of foreign competitive goods. They want to create foreign exchange for purchase of American goods parts by expanding U. S. tourist spending abroad to $3 or $4 billion dollars annually, mainly through low-cost air travel. Special import privileges should be set up, they say for stockpiling strategic materials. Even then, it is doubtful whether foreign sources will let the U. S. have enough copper, lead and zinc.

Foreign Report

BASED UPON REPORTS FROM THE MCGRAW-HILL WORLD NEWS BUREAU

British Firms See 400,000 Cars For '47 If Steel Supply Holds

LONDON—Although Britain's steel shortage will continue acute during 1947, the motor car industry will get enough steel to produce 400,000 cars (compared with a prewar peak of 390,000 in 1937), if the allocation for the first quarter is continued through the year. Genuine priorities, however, are given only to production connected with atomic energy, mining, conversion of plants from coal to oil, and housing.

During 1946, total output was 12,700,000 ingot tons, nearly 500,000 tons of steel having been lost through lack of coal. Estimates for 1947 are 13 to 13.5 million tons, with 1 million tons capacity converted to oil by the end of the year. Imports are not expected to be more than 750,000 tons, and releases from war stocks still held by the government, 250,000 tons. Exports will be limited to not more than 1 million tons.

The steel industry's moderization scheme calls for 2 million tons of new capacity. Plant costing about $80 million (out of $675 million) is under construction, much of it nearing completion.

French Machinery Needs

PARIS—Much of the $4 million worth of machine tools included in France's detailed modernization plan will be ordered in 1947, and a large slice of the business is scheduled to come to the United States. Leaders of French industry, labor and agriculture have approved a four-year plan for purchase of foreign equipment.

Beyond what has already been ordered, the plan includes U. S. Army surplus and whatever reparations may be obtained from Germany—to total $1,230 million.

Among the equipment purchases planned, in addition to the $4 million in machine tools, are: steel, $100 million; agriculture, $75 million; transport, $200 million; merchant ships, $320 million; foundries, $8 million; autos, $100 million.

India's Auto Operations

NEW DELHI, INDIA — Great Britain's Austin Motor Co., Ltd., is the latest entrant into the Indian automobile field, under an agreement reached with leading Indian Austin distributors.

Reflecting the trend towards Indian ownership and control of new industries, the agreement calls for native capital to own and direct the new concern—presumably with some minor stock participation held by Austin in return for furnishing advice, assistance, parts, equipment, etc.

In the first stage, the Indian concern will be an assembly operation only—similar to the deal under which the Birla industrial interests assemble an Indian version of the British Morris under the name of the "Hindustan" auto.

The first assembly plant will probably be built at Bombay where the labor supply is greatest, with a capacity of 3,000 cars annually.

Australian Tariff Tangle

MELBOURNE—Car plans of General Motors and other American automotive firms have come close to bogging down in a legal tangle over application of Australian by-laws to automotive machine tools, auto parts, spares and replacement parts.

The Australian Federal Chamber of Automotive Industries, representing GM, Ford, International Harvester, and Chrysler Dodge, opposes proposed cancellation of certain by-laws under which parts required for assembly in Australia enjoy preferential treatment. All, except Chrysler Dodge, plan to assemble cars in Australia. They point out the essentialness of imported parts for a long time to come.

If the by-laws were withdrawn, they contend, the landed cost of these items would be increased by 25 to 36%, and this increase would be passed on to the car buyer.

Another anomaly of the present tariff position is that the whole of an assembly, for instance a transmision assembly, can be imported free of duty and primage from Great Britain and Canada, whereas each of its components is manufactured in Australia under high measures of protection.

Spotting the Air News

Planes Sprayed for Storage

About 1,500 B-29 *Superfortresses*, worth $750,000 apiece, will be saved for any emergency by spraying on an airtight covering, 7 times tougher and stronger than rawhide, to keep out moisture for 10 years. Engines and parts are first removed and stored.

$1 Billion in Gross Business

Aircraft industry did a gross business of $1 billion in 1946; completed civil and military aircraft, $367 million; engines, propellers, parts—about the same; balance was in development contracts with Army and Navy. Production of military and private planes will decline in 1947, but dollar value of transport will increase.

Form Helicopter Council

Helicopter manufacturers have formed the Helicopter Council of Aircraft Industries Association. Two helicopters, Bell and Sikorsky, have been certified by CAA for commercial operation. McDonnell's twin-engine Navy helicopter lists 4,000 lb. useful load. Firestone 2-placer is being tested for CAA certification. Kellett 2-engine machine is planned for 10-placer commercial. First bulk delivery for commercial use was 3 Sikorsky's to Helicopter Air Transport. Helicopter will arrive, commercially, in 1947; for personal use, much later.

Water Injection Tried

Water injection for light aircraft engines has been developed by Longren Aircraft Co. Preliminary results with a Lycoming 0435-A engine show 10% increase in power, reduction of 1 gal. per hr. of fuel, and lowering of cylinder head temperature 22° by injecting 1 qt. water per hr.; 75° by injecting 3 qt. per hr.

Injection Carburetor

An injection carburetor, P. S. Series Stromberg, by Bendix Products Division, Bendix Aviation Corp., eliminates the vented float chamber and gives a closed and pressurized fuel feed system from fuel pump to discharge nozzles. It is non-icing and free from gravity effects in maneuvers.

Railroad Car Manufacturer Adds Sidelines to Cushion Order Lag

CHICAGO—Although prospects look good for the railroad car industry, General American Transportation Corp., one of the leaders in the field, is taking steps to cushion its business when orders for tank cars, freight cars and refrigerator cars lag.

The company is moving heavily into the plastics field, and expects a $10 million volume in plastics by next year. The firm has acquired two plastics concerns—McCoy, Jones & Co., of Chicago, makers of pliable plastics, and Eclipse Moulded Products Co., Milwaukee, producers of industrial plastics. In addition GATC is equipping its war-built East Chicago plant to produce large molded plastic products.

New Equipment Added

Sam Laud, GATC president, said the East Chicago plant, which has been furnished with $1 million in new equipment, is designed with large presses to handle molds of greater size than those customary in the industry. Products that are being made at East Chicago include washing machine agitators, toilet seats, shower heads, refrigerator trim and trays, radio cabinets, silverware boxes, and a wide variety of other items.

Not counting replacements for its own tank car fleet, GATC has a total backlog of $85 million in orders, including railroad cars and motor coaches.

An unusual machine developed by GATC is designed to be used by citrus juice companies for converting formerly wasted rinds into cattle feed.

Low-Alloy Steel Prices Rise

PITTSBURGH—Mills do not know exact condition of consumers' sheet inventories, but they think they are small in relation to their output program. This could change quickly in event of any severe recession, but is a strong point in sustaining steel production outlook now.

Among prices advanced recently were those of high-strength low-alloy steel, covering a number of items. Hot-rolled sheets were up $5.50 per ton. This type of steel has come forward rapidly since the end of the war, particularly in railroad equipment where much sheet and plate is used. Carnegie-Illinois Steel output of this type of steel in 1946 was three times greater than any previous year.

Wire product advances became general. Base prices of common nails were unchanged, but extra changes brought about an advance of about $5 per ton.

Names in the News

Harry K. Clark

W. R. Persons

Harry K. Clark has become executive vice president of the Carborundum Co., Niagara Falls, N. Y., and a member of the board of directors. Prior to the war, he was vice president and general manager of the Norton Co., Worcester, Mass. He recently retired from the Navy and during the war he was with the Emergency Plants Div., of the Army and Navy Munitions Board.

W. R. Persons has been named sales manager of the Lincoln Electric Co., Cleveland.

Otto W. Winter has been elected president of the Acme Pattern & Machine Co., Inc., Buffalo, N. Y., while **Thomas L. Holling** has joined the firm as vice president and treasurer.

Joseph Savage has been named factory manager of Snyder Tool & Engineering Co., Detroit. He had been associated with Chrysler for 17 years.

Harvey T. Graceley has been elected president of Marion Power Shovel Co., Marion, Ohio, to succeed **M. E. Montrose,** who has resigned.

Carl W. Littler, chief engineer of Jones & Laughlin Steel Corp. and its subsidiaries, retired after 21 years with the company. Prior to his association with Jones & Laughlin, he was with Westinghouse Electric & Manufacturing Co., National Tube Co., and Carnegie Steel Co.

Edward A. Ledeen, formerly chief engineer of Gotham Engineering Co., has been named general manager of Production Methods, Inc., New York City. Also, **Albert K. Trout** has been named manager of sales and negotiations for the firm.

H. E. Beane has been appointed general sales manager of The Bristol Co., Waterbury, Conn.

G. Lawton Johnson has been named general sales manager for National Tube Co., Gary, Ind.

James H. Marks, former executive vice president of the Packard Motor Car Co., has joined Dearborn Motors Corp., Highland Park, Mich., as a consultant to coordinate the procurement and engineering of farm implements.

R. T. Stafford has been appointed assistant to vice president W. C. Johnson and **J. W. McMullen** has become general manager of the Pittsburgh Works of Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Maurice J. Hoke has been appointed chief engineer of the Crankshaft and Camshaft Divisions of the Ohio Crankshaft Co., Cleveland.

W. H. Gourlie has been named exclusive sales and engineering representative for The Kelly Reamer Co., Cleveland, in Conn., except in Fairfield county, and in four counties of Mass. His headquarters are at 410 Asylum St., Hartford, Conn.

Harvey Hewitt, formerly sales manager in the Los Angeles district, has been made vice president in charge of sales for the Bethlehem Pacific Coast Steel Corp., succeeding **Paul W. Cotton,** who is retiring.

Mundy I. Peale, former vice president and sales manager of the Republic Aviation Corp., has become president, succeeding **Alfred Marchev** who is now chairman of the board.

William C. House has been elected vice president in charge of manufacturing and engineering of the Lyon-Raymond Corp., Greene, N. Y.

John F. Gordon, general manager of the Cadillac Motor Car Div.; **Ollie V. Badgley,** general manager of the Delco-Remy Div.; **Edward R. Godfrey,** general manager of the Frigidaire Div.; and **Frederick G. Hughes,** general manager of the New Departure Div., have been elected vice presidents of General Motors Corp.

Harry E. Lorenz has been appointed purchasing agent of Carnegie-Illinois Steel Corp. with headquarters in Pittsburgh.

Waldemar Naujoks, for 12 years chief engineer of The Steel Improvement & Forge Co., Cleveland, has resigned.

Harvey O. Yoder, co-founder and secretary-treasurer of the Yoder Co., Cleveland, has resigned as an officer and director of the firm.

Kenneth T. Fawcett has been appointed vice president of Dominion Brake Shoe Co., Ltd., Canadian subsidiary of American Brake Shoe Co.

John E. Garlent, executive vice president of Motor Wheel Corp., Lansing, Mich., since 1940, has been elected president of the corporation. He succeeds **Harry F. Harper,** president and general manager of the firm since its inception in 1920, who has resigned.

E. J. Harrington has been named manufacturing manager of the Affiliated Manufacturing Companies Dept. of General Electric Co. For some time an executive in automotive and aircraft fields, Mr. Harrington served as vice president of Curtiss-Wright Corp. during the war.

Erle E. Martin has been appointed general manager of the Hamilton Standard Propeller Div., United Aircraft Corp., East Hartford, Conn.

William L. Aiken has joined SKF Industries, Inc., as senior division engineer in charge of the automotive and marine department.

OBITUARIES

John W. Bray

John W. Bray, 79, vice president and director of the Bullard Co., Bridgeport, Conn., passed away Jan. 4 after a long illness. Mr. Bray joined Bullard in 1884 as an apprentice and advanced through the company until he was elected a director of the firm in 1930. Two years later he was appointed vice president in charge of sales.

Charles F. Bliss, 88, former president of Farrel Foundry & Machine Co., died Jan. 7. Mr. Bliss was with Farrel from 1881 until 1928 and served as its president for 15 years.

Charles B. Carr, 83, retired district manager of the Cleveland office of Gisholt Machine Co., Madison, Wis., passed away Jan. 8.

Charles J. Bellar, 61, retired president of Meters & Pumps, Inc., died Jan. 9. He retired in 1943 as head of the company which he founded in 1928.

Elisha H. Cooper, chairman of the board of directors of the Fafnir Bearing Co., New Britain, Conn., passed away Jan. 4. Mr. Cooper had been an official of Fafnir since its formation in 1911.

Viggo V. Torbensen, 88, founder of Torbensen Axle Co., Cleveland, died Jan. 4.

Harry R. Irwin, 72, founder and head of the H. R. Irwin Manufacturing Co., a Cincinnati machine tool firm from 1905 to 1929, died Jan. 1.

Joseph M. Barrett, 61, founder and head of Barrett Engineers for the past 13 years, passed away Jan. 2. He was formerly with Bailey Meter Co. and the S-C Regulator Co., where he was vice president and general manager.

John Harsch, 78, who founded the John Harsch Bronze & Foundry Co. in Cleveland 29 years ago, died Jan. 4.

BUSINESS ITEMS

Lodge & Shipley Co., Cincinnati, has acquired the turret lathe and hand screw machine business of **Acme Machine Tool Co.**

The Lincoln Electric Co., Cleveland, has moved three of its branch offices to: 1302 Stanford Ave., Emeryville 8, Calif.; 1500 Calzona St., P. O. Box 7336, Station L, Los Angeles 23, Calif.; and 113 No. Ninth St., Birmingham, Ala.

Petroleum Equipment Co., wholly-owned subsidiary of **Bethlehem Pacific Coast Steel Corp.,** has changed its name to **Bethelem Supply Co. of California.**

Rollo E. Falk, former vice president in charge of manufacturing and a director of Revere Copper and Brass, Inc., has resigned to establish his own offices at 17 John St., New York City. He will specialize as a consultant in operating problems in the nonferrous metal industry.

Electric Products Co., Cleveland, has appointed **The Udylite Corp.,** Detroit, as its distributor of E.P. electrolytic motor generators.

Link-Belt Co., Pacific Div., Seattle, Wash., has moved into its new plant at 3405 Sixth Ave. So.

The National Twist Drill and Tool Co. has moved all its manufacturing facilities from Detroit to Rochester, Mich. A stock room and office will be maintained at East Grand Blvd. and Brush St., Detroit.

The Hendey Machine Co., Torrington, Conn., has opened offices at 724 So. Spring St., Los Angeles and 420 Market St., San Francisco. **Edward R. Anderson** is serving as district manager for California.

The Kelly Reamer Co., Cleveland, has enlarged the territory of its sales and engineering representative, the **A. R. Shevlin Co.,** Boston, to include R. I. and Mass., east of and including Worcester county.

Acme Aluminum Alloys, Inc., Dayton, Ohio, has established an eastern sales division to cover eastern U. S. from Me. to N. C. and west to Pittsburgh. **James E. Kendig** will be in charge of the office, located at 702 Commercial Trust Bldg., So. Philadelphia, Pa.

Deere & Co., Moline, Ill., manufacturers of farm machinery has acquired most of the assets of the **Lindeman Power Equipment Co.,** Yakima, Wash.

A. O. Smith Corp. has moved its **Water Heater Div.** from Milwaukee to the firm's new plant at Kankakee, Ill.

Aro Equipment Corp., Bryan, Ohio, has appointed four new jobbers to handle its line of industrial air tools. These include: **Grayson-List & Co.,** Jersey City, N. J.; **Erie Manufacturing & Supply Co.,** Erie, Pa.; **Bay State Supply Co.,** Cincinnati, Ohio; and **Wilkinson-Kompass Ltd.,** Hamilton, Ont., Canada.

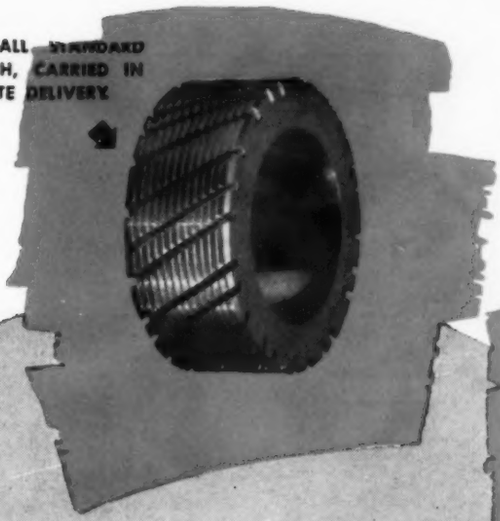
MEETINGS

American Society for Testing Materials. Spring meeting and committee week. Benjamin Franklin Hotel, Philadelphia, Pa. Feb. 24-28. R. J. Painter, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

American Society of Mechanical Engineers. Spring meeting. The Mayo Hotel, Tulsa, Okla. March 2-5. Ernest Hartford, assistant secretary, 29 W. 39 St., New York, N. Y.

Magnesium Association and U. S. Army Air Forces. Magnesium Exhibit. Wright Field, Dayton, Ohio. Feb. 18-20. T. W. Atkins, executive vice president, Magnesium Association, 30 Rockefeller Plaza, New York, N. Y.

CRUSHER ROLLS FOR ALL STANDARD THREADS 8 TO 32 PITCH, CARRIED IN STOCK FOR IMMEDIATE DELIVERY.



CRUSHER ROLLS FOR SPECIAL THREADS AND ANY TYPE OF PRECISION FORM CAN BE MADE TO YOUR SPECIFICATIONS.

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Headquarters

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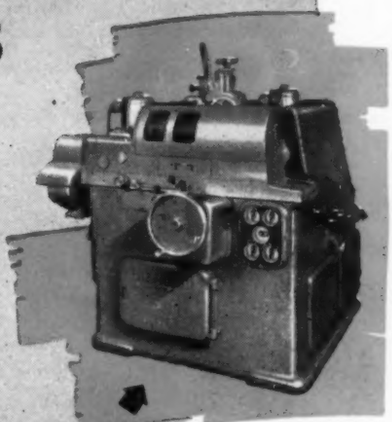
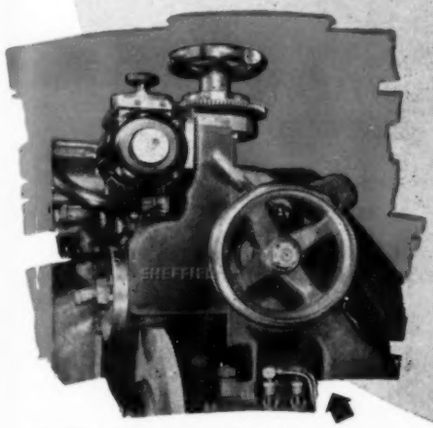
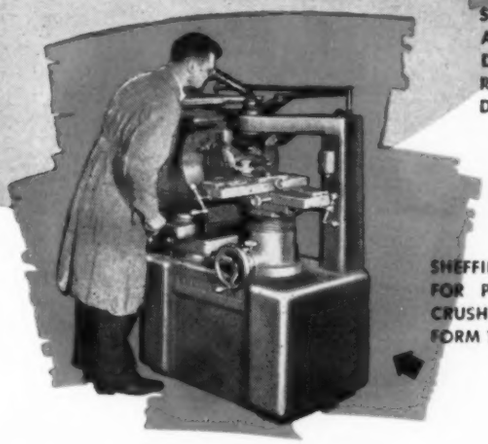


SHEFFIELD PRECISION THREAD AND FORM GRINDER FOR DUPLICATING CRUSHER ROLLS AND THE MASS PRODUCTION OF WORK PARTS THREADED OR FORMED.



POWER CRUSHING DEVICE FOR USE ON THE SHEFFIELD THREAD AND FORM GRINDER FOR THE ACCURATE CRUSHING OF WHEELS.



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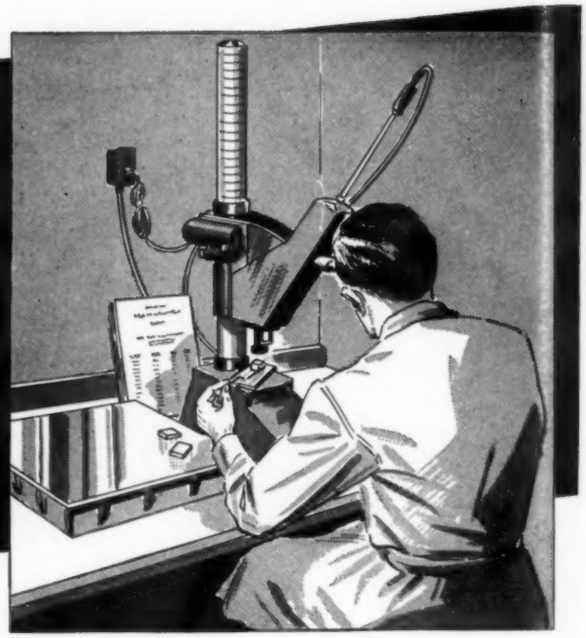
$15.00

84 BLOCK SET

(Other sets proportionately low)



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1. ***We will return the gage blocks with a Certificate of Inspection showing present size in comparison with master blocks CERTIFIED by the U. S. Bureau of Standards.***
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- ★ Heavy Duty Gage Blocks.
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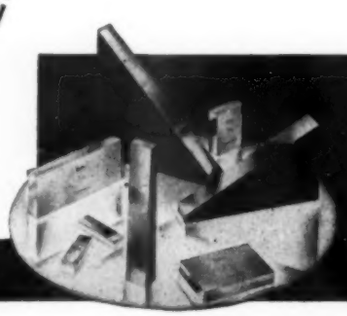


Webber
PRECISION GAGE BLOCKS

Tools for Finishing Behind Shoulders

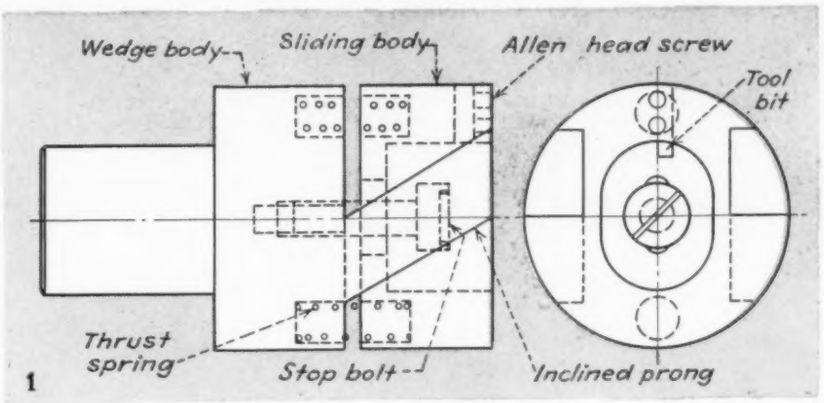
BY F. W. MILLER
and
CARL A. NAMUR

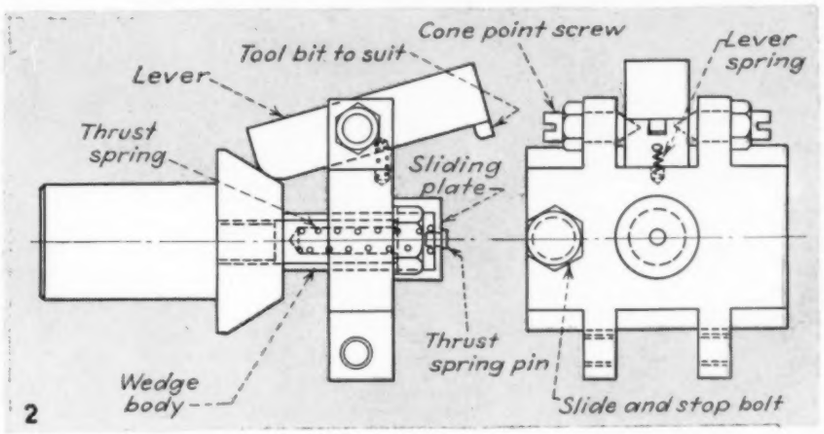
FIVE DESIGNS of recessing tools for turret use were illustrated in two earlier Reference Book Sheets. A related tool design problem occurs when parts must be finished behind shoulders. Tools 1 and 2 herewith are based on the third and fourth designs given for recessing tools. And these tools have been used in production. Tool No. 3 is a design suggestion for a tool to finish behind a shoulder.

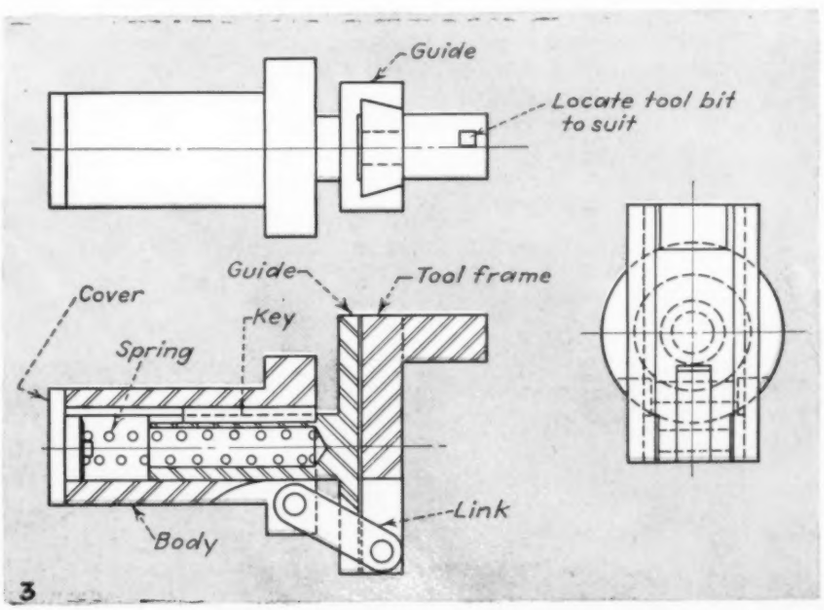
Tool No. 1—To finish the work, the sliding body (forced against the work) moves rearward and downward on the two inclined prongs. Starting position of the sliding body is determined by the stop bolt. Spring pressure returns the sliding body to the forward position when the tool is moved back from the work.

Tool No. 2—This tool is designed for work of larger diameter. Two pivoted levers carrying toolbits (one lever not shown for convenience) are caused to pivot into the cut by the wedge body, when the sliding plate is pushed backward over the tubular extension of the wedge body, carrying with it the lever holder. The tool was designed for a rearward travel of 9/16 in. at which point the tubular extension of the wedge body rests against a round recess in the sliding plate.

Tool No. 3—As shown, the tool is in its forward position. When the tool frame contacts the work, it presses the guide backward against spring pressure. Simultaneously the tool frame is moved downward in the guide by the link pinned to the stationary body. A key prevents rotation of the guide relative to the body.

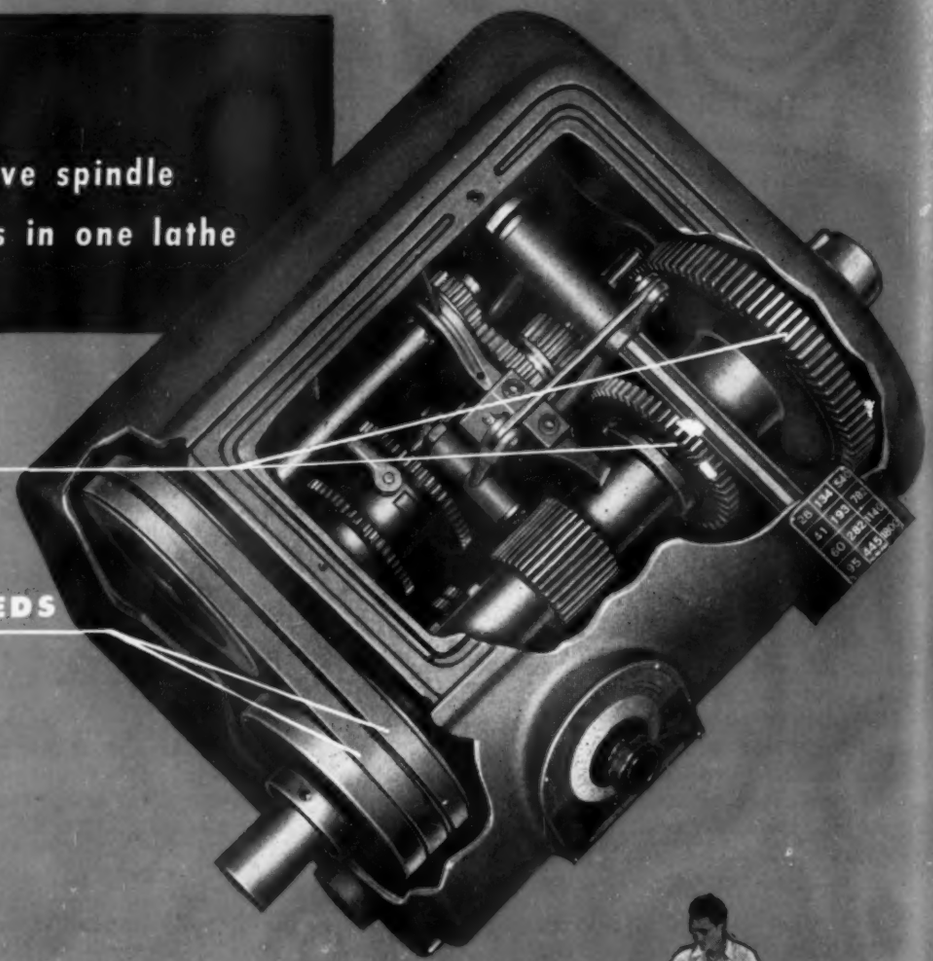






NOW

two productive spindle speed ranges in one lathe



THE NEW LEBLOND DUAL DRIVE

The two spindle speed ranges available thru the dual driving mechanisms in the LeBlond Dual Drive open an infinitely wider range of turning. This combination belt and gear drive principle—plus a 15" swing over the ways and center distances starting at 30"—makes the Dual Drive ideal for production, maintenance, experimental work, apprentice training . . . or wherever modern metal turning is required.

The Dual Drive will be a welcome addition to your shop. It's extremely easy to operate, and it's easy on the operator. Dollar for dollar, it's a lathe you'll put less into and get more out of than any other lathe in your plant. See the Dual Drive in action at our plant daily.

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LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES
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PLUS TEN BIG STANDARD FEATURES . . .

1. 12 speed combination gear and belt drive headstock.
2. Single lever speed control, direct reading plate and guiding arrow.
3. Rapid Speed Selector.
4. One-piece apron with positive jaw feed clutch and one-shot lubrication.
5. Clutch and brake with 2-station control.
6. 3-hp main drive motor in cabinet leg.
7. Feed box totally enclosed, self-lubricating.
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9. Multiple Automatic Length Stops.
10. Deep steel chip pan.

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REFERENCE BOOK SHEET

Potential Hazards from Molten Salt Baths

COURTESY NATIONAL BOARD OF FIRE UNDERWRITERS

REPORTS indicate that approximately 30% of all heat-treatment is conducted in molten baths, and that the incidence of fires and explosions, accompanied by large property losses, is rising.

Molten salt baths can be divided into three categories:

1. Low-temperature (300-1000 F)—the salts being largely nitrates and nitrites, and the bath the most dangerous.
2. Medium-temperature (1000-1750 F)—usually eutectic mixtures of chlorides and carbonates, and cyanides. The last requires special precautions.
3. High-temperature (1750-2400 F)—mixtures of barium chloride, borax, sodium fluoride, silicates, magnesia or lime, and other substances.

Hazards prevalent in the molten salt bath process are:

1. Fire by contact of molten salts with combustibles.
2. Explosion through chemical and physical reactions.
3. Physical danger to operator by gassing or burns.

Causes of Accidents

Steam explosion and spattering—Water may enter the bath in several ways: as carry-over from quench tanks, leaks from pipes or roof, moisture entrained in air for agitating the liquid melt, splashing from rinse tanks, operation of fire-fighting equipment, and tipping of food containers placed on ledges or bath covers for heating.

Air entrapment—Air trapped in tubes or metal work may expand with spattering of molten salt, or rupture the work with explosive violence.

Reaction with combustibles—Free or combined carbonaceous materials (oil, soot, tar, cotton waste, graphite) are easily set on fire by molten baths; molten nitrates react explosively with cyanides, and with aluminum alloys containing 1 or 2% magnesium if heated above 1000 F; structural failure of bath container may cause explosive reaction with accumulations of soot, carbon and tar in furnace box.

Reaction with pot material—Nitrates will react with mild steel containers and start brisk combustion at temperatures as low as 1100 F. For this reason, baths in such containers should be limited to 1000 F.

Overheating and thermit reaction—Iron oxides in sediment or sludge at bottom of molten nitrate baths may overheat and react with overheated aluminum alloy to cause a vigorous thermit reaction; failure of temperature or heat controls may cause overheating of nitrate bath, particularly overnight or during week-end idling periods; burning through of bath container.

RECOMMENDED PRECAUTIONS IN OPERATION OF MOLTEN SALT BATHS

1. Segregate process in room of 2-hr. fire resistance; do not equip immediate area with automatic sprinklers; make sure roof and overhead piping are leakproof, permit no wood in vicinity of baths.

2. A liberal operations zone should be spaced off adjacent to the bath to avoid conjestion. Locate quench tanks, if adjacent to process, at lower level and fit them with guards or baffles to prevent accidental splash-over into molten salt bath.

3. Locate all overhead service pipes for water or steam so leakage into the bath is not possible.

4. Store nitrate salt in a separate, fireproof and damp-proof building. Permit no loose, secondary storage in heat-treating area. Store salts in tight drums to avoid absorption of atmospheric moisture. Mark drum and furnace so explosion will not occur by accidental mixture of salts. Set up controls so magnesium parts can not be introduced to baths used for aluminum-alloy work.

5. Maintain good housekeeping by removing all combustible materials—oil, cloth, paper used in other phases of processing—from vicinity of salt baths. Furnace charges or additions should be made from cans, not sacks. Discard waste nitrates and unwanted bath residues in water solution; never mix with other waste products or burn in incinerator.

6. Precautions with respect to equipment, controls and maintenance are:

(a) On oil or gas-fired furnaces, install an approved device to prevent discharge of unburned fuel. Inspect and adjust burners at intervals to reduce soot formation.

(b) Two independent, automatic temperature-control systems are advisable on all nitrate baths, one for recording and the other acting as an over-riding cutout. It is good practice to adapt these controls to provide audible and visible warning of overheating. Seamless thermocouple protection tubes should be provided. Appearance of foaming, "boils," or convection currents in baths should be interpreted as indications of dangerous hot spots. Place emergency manual controls at safe distance from furnace. Display a sturdy sign: "Do not permit temperatures above 1000 F." near nitrate baths.

(c) When the salt bath is left unattended at the end of the work period, the transformer step-switch should be set down to the idling stop and the cover closed.

(d) Provide emergency storage for the contents of a damaged bath by erecting a low concrete wall or ridge around the bath, so it forms with the cement floor a tank big enough to hold the bath contents.

(e) Empty and inspect nitrate bath containers at least once in six months. Also examine electrodes or heating units.

7. Operating requirements.

(a) Wash and dry hooks, fixtures and ladles before use in other baths. Note: Oil on work or fixture will burn off when chloride salt baths are involved, and hence need not be cleaned.

(b) Preheat work drawn from quench tanks to drive off moisture before introducing into molten salt baths.

(c) Avoid tubes or tools of tubular construction; vent hollow metallic articles to avoid explosions from entrapped air.

(d) Clean sludge at frequent intervals, say a week, if bath is in constant operation. Instill a catch-all wire basket of chrome-nickel wire to retrieve small parts that fall to bottom.

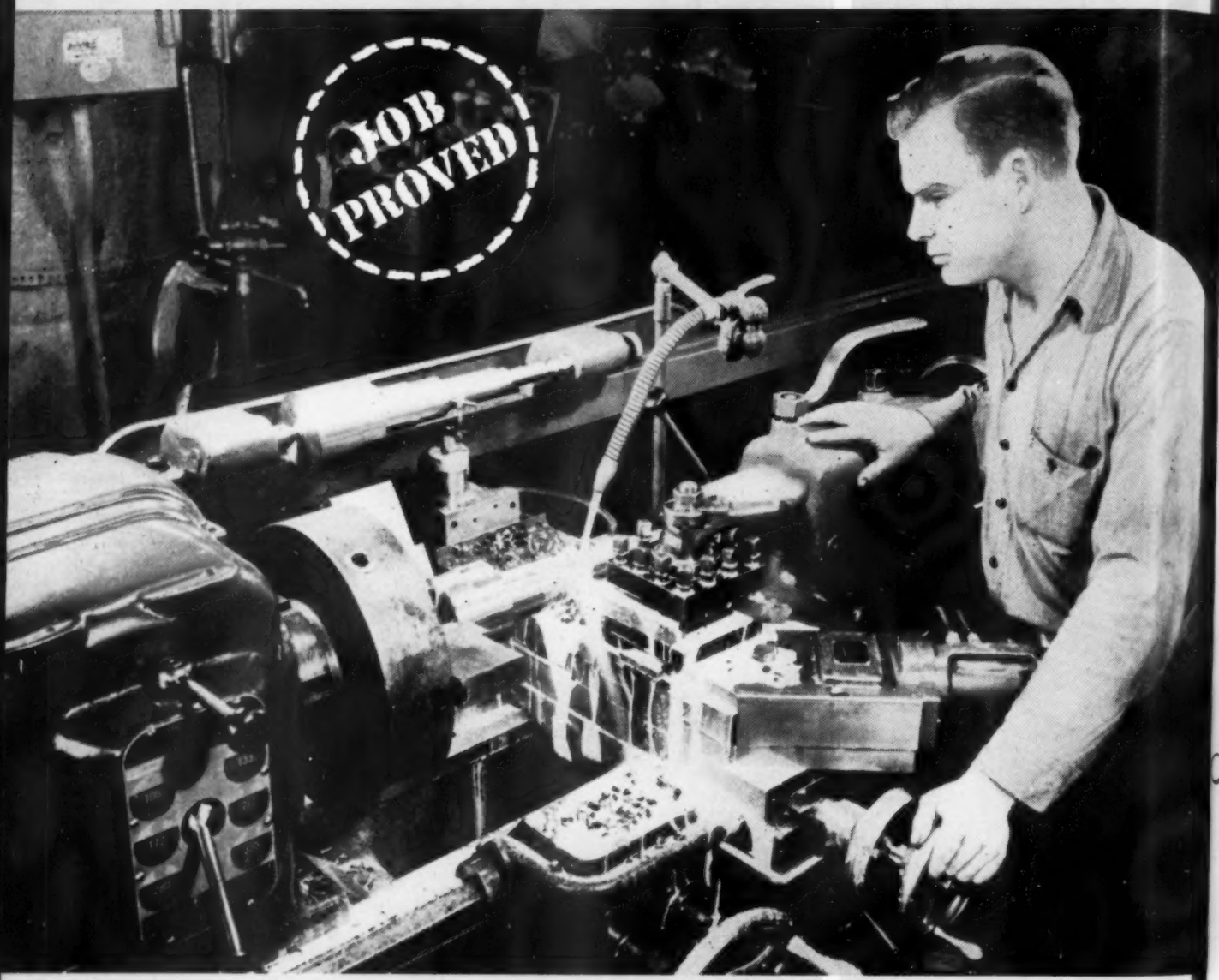
(e) If nitrate bath exceeds maximum temperature limit: shut off heat supply, remove work from bath if possible, get employees to safe place, call fire brigade and prepare for explosion if heat continues to rise after first two steps are taken.

8. Fire protection.

(a) Provide adequate supply of buckets of clean, dry sand at several locations inside and outside the department. If large quantities of sand may be required, use bins and keep shovels at hand. Sand is best used to confine and dike the escaped melt. Carbon-dioxide and approved dry-powder extinguishers may be used to put out fires in carbonaceous material near salt baths. Never use vaporizing liquid—water, foam, or other aqueous agents—in fighting molten salt fires.

(b) Place warning placards outside factory to warn firemen of nitrate baths and invite local fire companies to inspect installations and familiarize themselves with locations of salt baths.

Turning S.A.E. 4145 Annealed . . . 315 S.F.P.M.



SUNOCO EMULSIFYING CUTTING OIL

Cools and Lubricates Carbide Tool Removing approximately 23 Cubic Inches of Metal per Minute

Here are the facts on a typical job where Sunoco Emulsifying Cutting Oil makes possible heavy cuts on annealed 4145 steel.

- Operation: Turning 4½" shaft and removing approximately 23 cu. in. of metal per minute
- Machine: 16" x 54" "AMERICAN" Pacemaker multi-production lathe
- Material: S.A.E. 4145 annealed steel
- Spindle Speed: 280 R.P.M.
- Depth of Cut: ⅜"
- Cutting Speed: 315 S.F.P.M.
- Feed: .017"
- Type of Tool: Cemented carbide
- Cutting Lubricant: 1 part Sunoco to 20 parts water

Sunoco Emulsifying Cutting Oil forms a stable emulsion when mixed with water. Its lubricating and cooling qualities make it particularly efficient for precision work at high speeds.

For more production . . . better finish . . . longer tool life . . . call your Sun Cutting Oil Engineer or write Department AM-1.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

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SUN

SUNOCO

INDUSTRIAL PRODUCTS

Cutting Fluids for Various Materials

FOR WORK ON AUTOMATIC BAR AND CHUCKING MACHINES

Courtesy The National Acme Company

MATERIAL	Brinell Hardness	Paraffin Oil	Sulphur Base Oil-Chlorinated	Lard Oil	Kerosene
Mild Steel C 1016—19—20—22—23	143 Min.				
Bessemer Screw Stock B 1111—12—13	179—228	8 Parts	1 Part		
Carbon Steel C 1025—30—35—40—45	170—228	5	1	1 to 2%	
		or		as	
Free Cutting Open Hearth C 1117—1118—37		4	1	needed	
Stringy Steel C 1008—10—15	143 Min.	4	1	3%	
Stainless Steel 303—416		4	1		
Monel Metal Type R		4	1		as needed
Brass Yellow Free Cutting		Pure Paraffin			
Aluminum 17ST—Free Cutting		4			1

Deep hole drilling and forming. Thin wall work, also carbide tipped tools

Range from 10 to 5 parts water with 1 part Soluble Oil.

FOR CHASING OR THREADING WITH A DIE

Courtesy Westinghouse Electric Corporation

MATERIAL	COOLANT
Aluminum	20% lard oil and 80% kerosene
Brass and Bronze	Dry Sulphurized oil on final cut
Cast Iron	Dry
Copper	20% lard oil & 80% kerosene
Malleable Iron	20% lard oil and 80% sulphurized oil
Monel Metal	20% lard oil and 80% sulphurized oil
Steel, Mild	20% lard oil and 80% sulphurized oil
Steel, Tool	20% lard oil and 80% sulphurized oil
Steel, stainless	Sulphurized oil
Steel, Alloys, Forgings	20% lard oil and 80% sulphurized oil
Rubber, Hard	Dry
Micarta, Moldarta and other molded plastics	Dry

Note: The above recommendations are subject to modifications determined by type of operation, tool feed, speeds and other factors. It should be understood that many variations can occur, but these recommendations are made from observations of a wide variety of screw machine and chucking work.

Whenever a turret lathe is equipped to pump sulphurized oil, this fluid can be used instead of the lubricant listed above for all threading operations.

RULE OUT *Wasted time*

Too narrow a face on a grinding wheel can mean too much time on the job. Why use a wheel with a 1″ face, for instance, when one with a width of 1½″ to 2″ can increase surface contact 25 to 50%? This time saving efficiency is yours in the complete line of Simonds Abrasive wheels. Whether for rough snagging or for precision finishing there is a Simonds wheel to measure up to your most exacting requirements for maximum production with speed and efficiency. A copy of the Simonds Abrasive Data Book is available to guide your selection. Write for yours today.

For assistance in requisitioning consult Simonds Abrasive distributors located in all principal cities.

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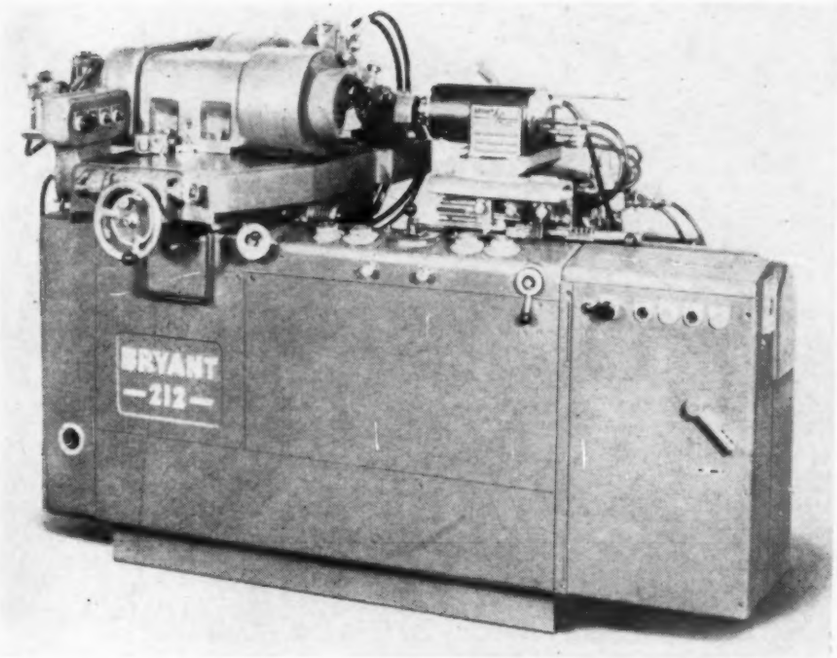
Shop Equipment News

Bryant Automatic Internal Grinder Has Choice of Three Sizing Methods



Hydraulic operation of movements of the Bryant No. 212 internal grinder results in flexible operation. Electrical cycle control permits changing the cycle to suit the requirements of the work

An automatic internal grinder designed for precision high production with minimum operator attention, No. 212, is announced by Bryant Chucking Grinder Co., Springfield, Vt. The machine has a 9-in. swing inside the standard water guard and a 12-in. wheelslide traverse.

Crossfeed is by movement of the workhead, supported on roller bearings. Work with bores from 5/16- to 3½-in. dia. can be ground. Grinding traverse permits grinding 3-in. lengths. For small bores Hi-Frequency wheel spindles operating up to 100,000 rpm. may be used.

Rigidity is provided by the Bryant cylindrical slide construction. The slide bar, to which the wheelslide is attached, is supported on two bearings in the base of the machine, while a shoe under the rear of the wheelslide follows a hardened and ground control plate. This provides three-point support. Each of these points is lubricated by pressure feed.

Three methods of automatic sizing are available, with the basic machine designed so that the method used can be changed if desired by adding the appropriate sizing equipment.

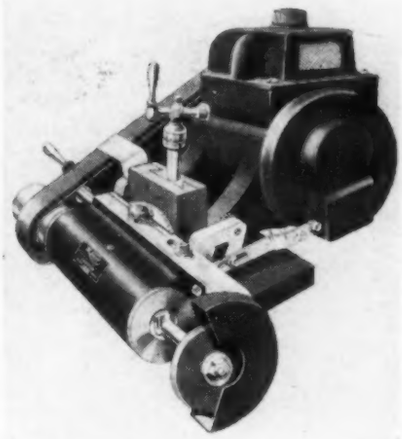
Sizing from the truing diamond is accomplished by predetermined advance of the wheel beyond the wheel-truing position between the rough and finish grinding positions of the cycle. The machine automatically compensates for wheel wear.

Automatic plug sizing is accomplished by a plug gage mounted in the work spindle. This checks the bore size after each pass of the grinding wheel. As the plug gage enters the bore, the machine stops grinding and the wheel withdraws from the bore.

With the third method of sizing, a diamond-tipped finger contacts the bore as it is being ground, operating electrical contacts at the proper time to stop the grinding action and withdraw the wheel from the bore ready for loading of the next workpiece.

Where required, one operator can handle several machines. Standard or special tooling may be used to meet requirements.

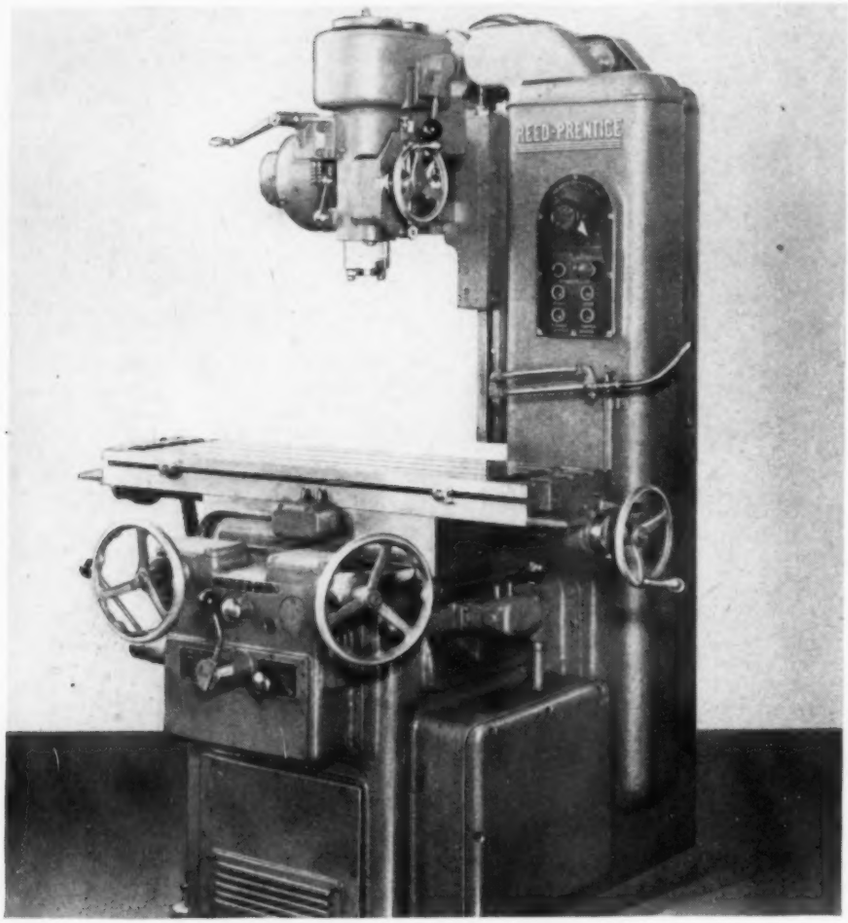
Koett Universal Machine Unit Has Speeds 500 to 40,000 Rpm.



A self-contained unit for milling, grinding, boring and dovetailing that can be mounted on a drillpress, milling machine or lathe, is produced by Koett Universal Inc., Oneonta, N. Y. Speeds may be varied from 500 to 40,000 rpm., with alternating or direct current. The spindle has vertical travel up to 5 in., and horizontal travel to 2 in., both adjustable in thousandths, and can be tilted 30° left or right.

Vertical milling can be performed on a horizontal milling machine by attaching the unit to the overarm without disturbing the horizontal set-up. Among operations which can be performed when mounted on a drillpress is grinding spiral or straight cutters. The unit can be operated in a vertical or up-end position when desired.

Reed-Prentice Universal Miller Built to Make Molds, Dies, Jigs



Reed-Prentice No. 12V milling machine has longitudinal and cross feeds infinitely variable from 1/4 to 24 ipm.

The 12V universal-head milling and die-sinking machine built by Reed-Prentice Corp., Worcester 4, Mass., is designed for toolroom work, especially making molds for plastic and rubber, dies for forging and die-casting, and jigs and fixtures.

Mounted on a sliding ram, the head can be adjusted for all angles up to 45° front to back and 30° left to right. It can be depressed to the horizontal position for milling with an arbor. Spindle speeds are infinitely variable from 90 to 2200 rpm. through a Reeves drive and one back-gear. The feed rate is infinitely variable from ⅛ to 16 ipm. Automatic feed stops are adjustable on table, cross saddle and vertical saddle.

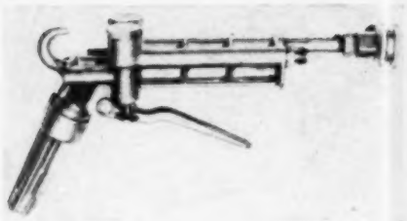
The machine has a quill-type milling and boring head mounted on an adjustable ram. Spiral bevel gears are used on the spindle drive. One-shot lubrication is used on cross and longitudinal ways and feed screws.

Gearing is located at the front of the machine where it can be reached by removing one panel. Table ways are provided with built-in chip removal. A pad is provided on the head for mounting shaping or high-speed milling attachments if they are needed.

The spindle is designed so that a flywheel can be installed at any time for use with carbide cutters.

Electrical control is from a single pushbutton station on the front of the column which contains all push buttons and speed and feed controls. Two levers control directional feed and rapid traverse of the table, front and back or right and left.

Maximum vertical distance from the table to the face of the spindle is 18 in.; from spindle to column the maximum distance is 26 in., and the minimum is 12 in. The table is 12 x 46 in. Vertical travel of the spindle is 5 in.



CLEANING GUN—A light-weight air and water gun controlled by a finger-tip lever, is produced by Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif. Eliminating the necessity for valve adjustment, the gun is designed for pressure rinsing and removal of dirt and grease. It operates on regular air and water pressures

Cunningham Safety-Steel Stamp Has Countersunk Finger Grips

The "Nu-Grip" safety-steel stamp with a countersunk "finger-sized" hole on all four sides for better grip has been announced by the M. E. Cunningham Co., 95 E. Carson St., Pittsburgh, Pa.

The stamps are available in all standard sizes from 1/32 to 1 in. The characters are on heavy-duty blanks, built for all kinds of stamping operations.

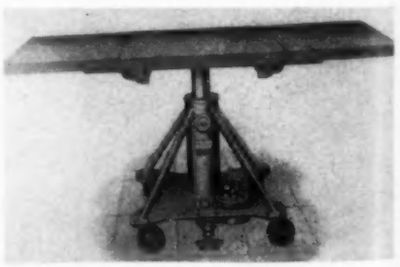
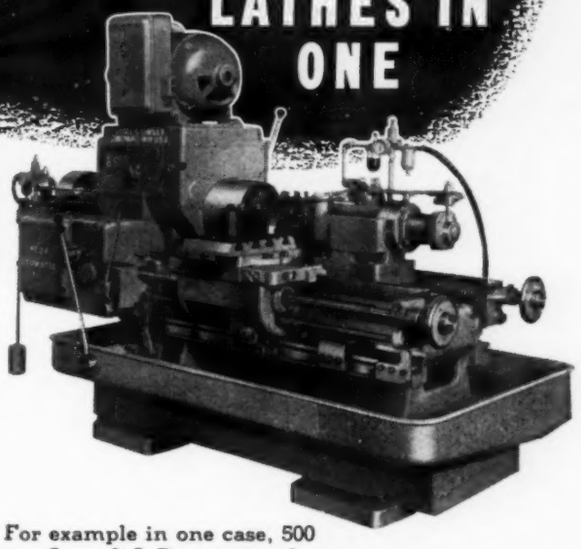


TABLE EXTENSION—Removable table-top extensions are available for hydraulic elevating tables built by Lyon-Raymond Corp., 2987 Madison St., Greene, N. Y. For applications where strip and sheet feeding to presses is required, the extensions provide support for a length of 72 in. Extensions are disengaged by lifting the outer end

Double up WITH A DUOMATIC

LIKE TWO LATHES IN ONE



Get Any Combination of Turning or Facing Cycles... front and rear

● You get the production of two ordinary lathes with the new Lodge & Shipley 2-A Duomatic on the job. On this automatic lathe, front and rear tool slides operate together or singly, performing an amazing range of straight and angular turning and facing operations. The 2-A Duomatic is so completely automatic even unskilled workers handle complex multiple tool jobs with ease.

On long or short runs, the 2-A Duomatic, like the larger 3-A model, has shown startling savings in time and effort. For example in one case, 500 small shafts produced on an engine lathe, required 55 hours. On a 2-A Duomatic, the same number of pieces were set up and run in just 18 hours.

"Changeover time" is at a new low with the 2-A Duomatic. There are no cams. Simple, mechanical adjustments eliminate costly, time-wasting cam changes. Lodge & Shipley Engineers will be glad to explain in detail how the 2-A Duomatic can speed your lathe production. Simply write on your letterhead for Bulletin 635.

KNOWN THE WORLD OVER · FOR GOOD LATHES ONLY · L&S LATHES

THE LODGE & SHIPLEY COMPANY

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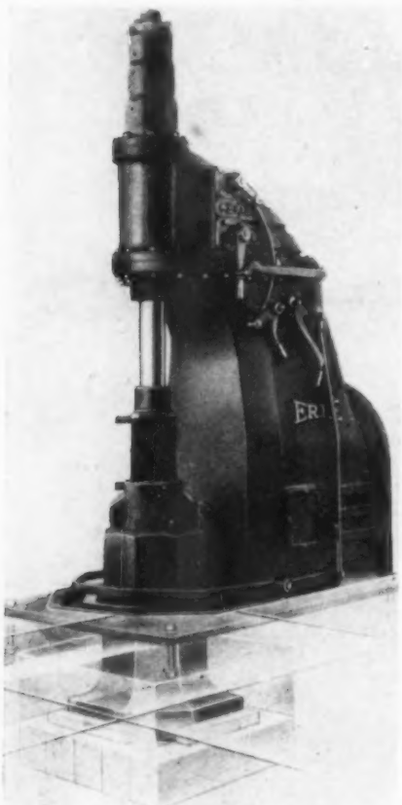
MACHINE TOOL DIVISION 3055 COLERAIN AVE. • SPECIAL PRODUCTS DIVISION 800 EVANS ST.

Erie Foundry Pneumatic Hammers Have Guides Twice Stroke Length

A line of pneumatic hammers has been developed by Erie Foundry Co., Erie, Pa. The standard models have moving weights from 200 to 3000 lb. with motors from 10 to 150 hp. The number of blows per minute varies from 200 in the smallest hammer to 85 in the largest.

The hammers are designed so the piston is located at the middle of the piston rod, and it is forged integral with the rod. The top end of the rod runs in a guide formed in the top cylinder head so that the striking mass is held in alignment by the top guide and the guide in the gland at the bottom of the cylinder. The length of guiding surface is twice the length of the stroke, even when the hammer is die-to-die.

The bore of the cylinder is not used in guiding the ram, to prevent wear on the bore. The top extension of the piston rod has two flat, machined surfaces which ride in flat guides of the cylinder extension, preventing rotation of the rod and piston.



Erie pneumatic hammers have an unloading valve so the motor can be started without developing pressure in the compressor. When the motor and flywheels are up to speed the valve is moved to operating position

The crankshaft has two heavy flywheels to smooth the load curve and reduce the motor requirements. Bearings are at the ends of the shaft with flywheels and crank between them to minimize stresses in the crank.

When the ram is suspended at the top of the stroke or clamped die to die, excess air is diverted to a receiver built into the hammer. When this pressure is built up to a predetermined point, no more air is compressed, avoiding dissipation of air through a relief valve.

Control is by either treadle or lever. A second lever can be used to clamp work between dies at maximum pressure. An additional valve with lever control utilizes the pressure in the receiver to strike single blows. When the lever is pushed forward the ram strikes a blow, with speed and force dependent on the speed with which the lever is moved. When the lever is returned, the hammer lifts. A skilled operator can strike single blows by depressing and quickly releasing the treadle, but this auxiliary control gives greater control over the force of the blow and is easier to use.

A mechanical forced-feed lubricator is built into the pneumatic hammers. Lengths of stroke vary from 14 to 38 in. and total height above the floor varies from 90 to 197 in.

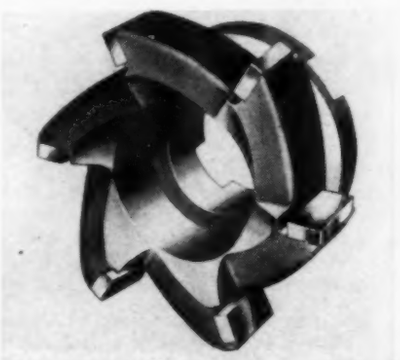
Lincoln's Fleet-Arc ac. Welder Boosts Current as Arc Is Struck

An ac. welder, Fleet-Arc, which is equipped with a booster to augment the current the instant the arc is struck, has been developed by the Lincoln Electric Co., Cleveland 1, Ohio. The arc is started automatically without using high-frequency devices when the electrode touches the work.

A selector switch controls the amount of booster current to be used in striking the arc. It can be varied to suit requirements for thin sheets or heavy plates. Continuous and self-adjusting current control is provided. Adjustment is made by a hand wheel with the amperage indicated on a calibrated dial. A new reactor control has been designed for high responsiveness to changing arc conditions. The welder is said to duplicate the range of output of dc. welders.

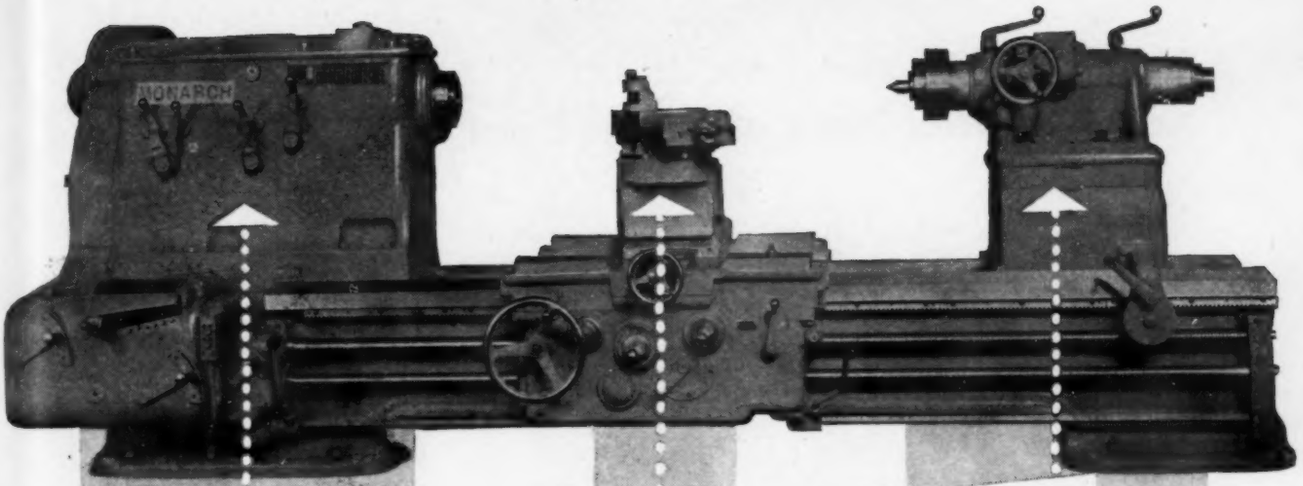
A thermostatic control opens the magnetic starter when overloading, to permit sustained welding at high current values. The welder is produced in 200, 300, and 500 amp.

Vascoloy-Ramet Shell End Mills Have Carbide and Tantung Tips



Two lines of shell end mills are announced by Vascoloy-Ramet Corp., North Chicago, Ill. The Red Streak carbide-tipped and Blue Streak Tantung-tipped mills are manufactured in right- and left-hand styles. Sizes range from 2½- to 4½-in. outside dia. with bores from 1 to 1½ in.

The Red Streak mills are available with negative radial and axial rake angles for steel and zero rakes for cast iron and other materials.



FOR ADDED SWING – *Economically*

Need added swing for an occasional big part—or for turning shafts with a previously-machined large-diameter section? Is your production mostly modified disc shapes—light cuts on big diameters?

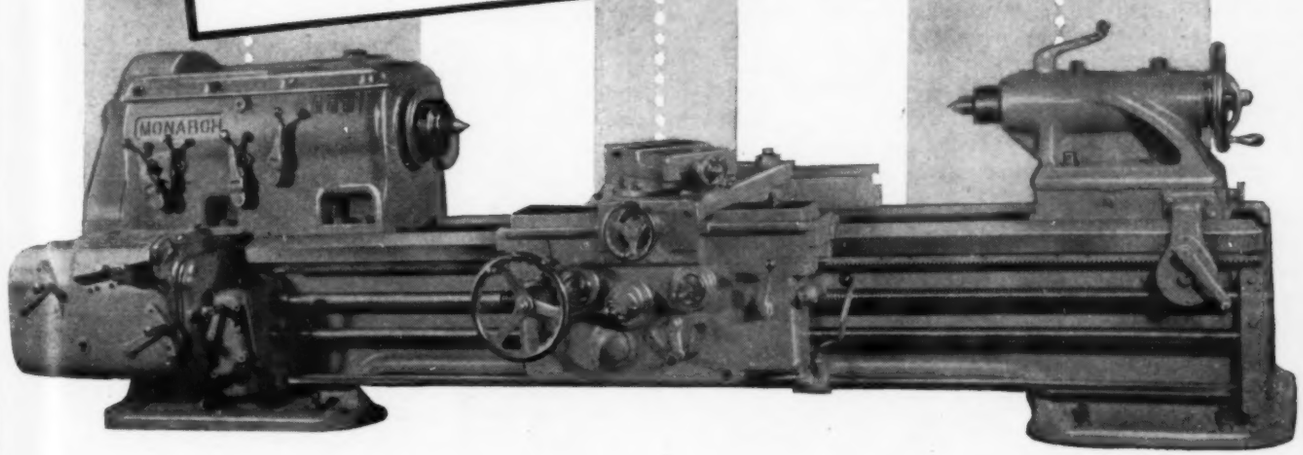
If your answer is *yes*—for any of these reasons—Monarch has a practical, economical way of giving you that extra swing without the unnecessary extra power and expense of ponderous oversize machines. Let our foundry pour added swing into a new Monarch for you—*we can raise the machine in the sand.*

Monarch builds its *standard* machines with the exceptionally wide beds and rugged proportions necessary to give you added swing, without sacrificing normal high production and precision operation. All raised castings are machined in standard jigs and fixtures, this being further assurance of the same accurate performance for which standard Monarch Lathes are famous.

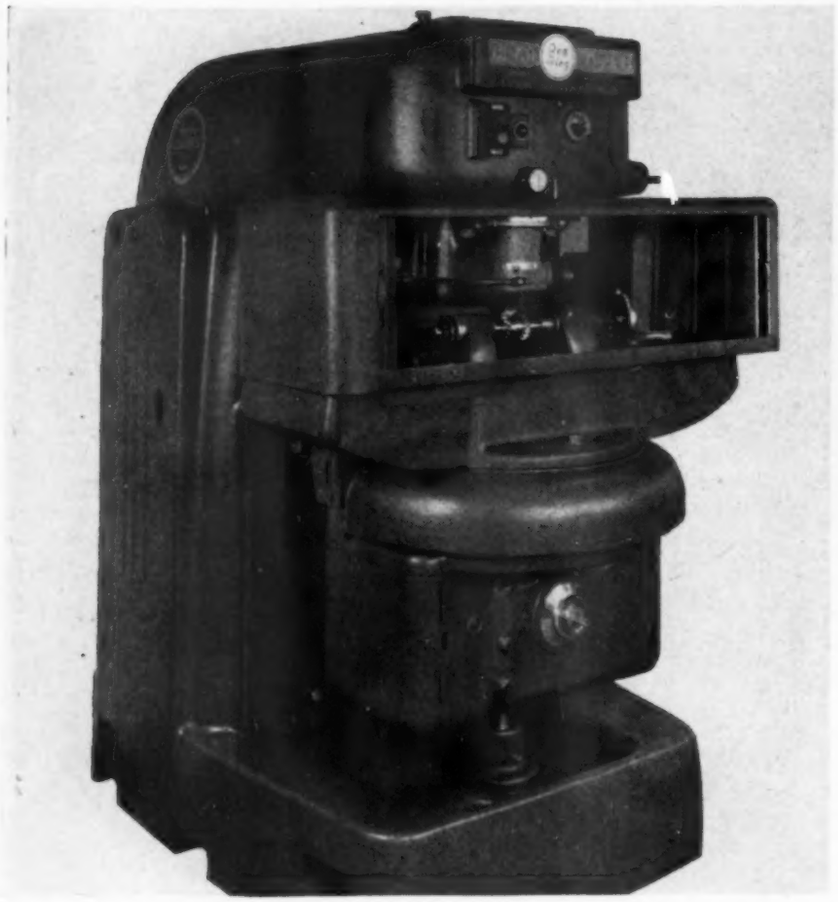
If our application engineer says we can save you money on your regular production, a standard Monarch machine (any size from 12″ swing up) will be modified to give you a special-order raised machine that matches your swing requirements. May we send an engineer to talk it over?

THE MONARCH MACHINE TOOL CO.
SIDNEY, OHIO

ACCURACY · ECONOMY · LONG LIFE
Monarch
TURNING MACHINES



Red Ring Gear-Shaving Machine Has Diagonal Feed of Work Gear



Red Ring gear shaver has diagonal feed of the work. Among other features this permits varying the amount of crown to the maximum crown ground in the cutter by varying the angle of feed

Work is fed at an angle to its axis in the Red Ring diagonal gear-shaving machine developed by National Broach & Machine Co., 5600 St. Jean Ave., Detroit, Mich. In previous models the direction of feed has been parallel to the work-gear axis.

The angle is selected with reference to dimensional and physical characteristics of the work to obtain the best cutting speed and surface finish.

The diagonal traverse facilitates shearing at each cutting edge, making it possible to remove more stock per cycle and with a shorter cycle. The entire cutting cycle consists of two passes through the cutter. The work gear mounted on the machine illustrated was shaved in 15 sec., removing 0.010 in. over pins.

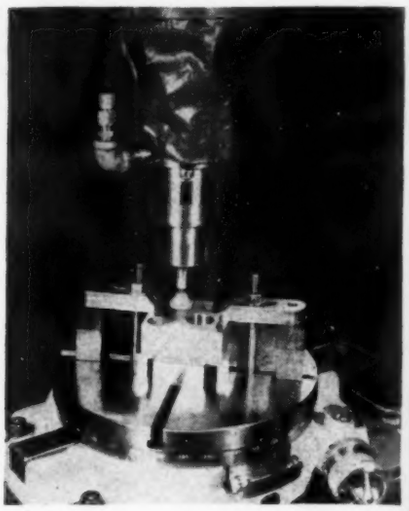
The full face width of the cutter is effective during each cutting cycle, which extends cutter life. On the other hand, cutter face width may be considerably less than the face width of the work gear, so that the cost of extremely wide-faced cutters can be avoided.

Diagonal shaving is said to give better control of lead on helical gears, result in less danger of cutter breakage when processing shoulder gears with less trouble with tapered tooth conditions.

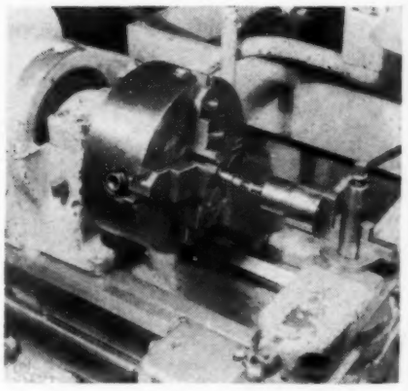
On the new machine the center distance between cutter and work gear remains constant. This eliminates the necessity for the operator to raise the knee each time after he loads a gear.

Vulcanaire Adapts Machines To High-Speed Jig Grinding

A high-speed, air-driven attachment, the Vulcanaire, which will convert jig borers and other machine tools to precision jig grinders has been developed by the Vulcan Tool Co., 730 Lorain Ave., Dayton 10, Ohio. The Vulcanaire is furnished with an adapter to fit the chuck of the machine tool on which it is to be used.



Without adapter and grinding wheel the Vulcanaire has a length of 7½ in., and is 2½ in. in dia. Here it is used for jig grinding



This model is designed for mounting in the toolpost of a lathe

Speed can be controlled from 30,000 to 75,000 rpm., with from 4 to 8 cu. ft. of air per min. required for this range. Chuck capacity of the unit is ¼ in. Holes from 1/16 to 1½ in. in dia. can be precision ground with the unit, which is 7½ in. long.

The Vulcanaire is furnished with the adapter, dust collector, air filter, pressure gage and oiler. In addition to jig borers, it can be used for adapting lathes, milling machines, and internal and surface grinders for high-speed precision grinding operations.

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

AMERICAN PHILLIPS SCREWS are "FIRST MATES" Cost-wise

...BOTH TO BOAT-BUILDERS AND OWNERS

In shipyards (as in automobile plants, refrigerator factories — *or what's yours?*) American Phillips Screws deliver these special savings: Swift, sure-handed handling. Automatically straight driving. Protected, unspoiled work-surfaces. More and better work done far more easily. All of which translate into TOTAL TIME-SAVINGS AS HIGH AS 50%!

And American Phillips savings reach straight through to the buyer of the boat. For these screws resist corrosion, withstand vibration, remove screw-driving from his maintenance work, help to keep his craft always trim, tight, and shipshape.

You can steer by this: American Phillips Screws are profitable not only production-wise. They're potent sales promotion, as a mark of quality construction . . . and they're sound sales-protection, too. *You* can get these same production and sales advantages in American Phillips Screws in any type or metal (see below) for any fastening requirement. Write.

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

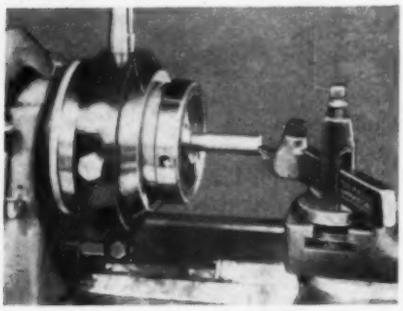
Chicago 11: 589 E. Illinois Street *Detroit 2:* 502 Stephenson Building

AMERICAN PHILLIPS *Screws*

ALL TYPES

ALL METALS: Steel, Brass, Commercial Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

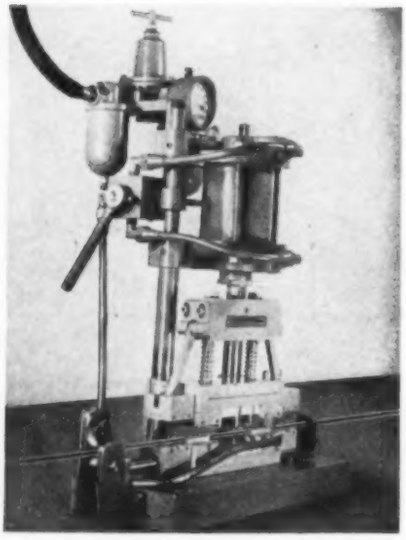
Porst Lever-Operated Chuck Holds Predetermined Pressure



The Levermatic collet chuck with a capacity up to 1 in. is produced by Porst Bros., 259 N. California Ave., Chicago 12, Ill. The chuck includes a collet which is said to give a straight parallel grip on the work at all times.

A knurled hand-operated selective adjustment ring will maintain a predetermined pressure on the work. The chuck threads on to the lathe spindle nose and is operated without stopping the spindle by a hand-operated shifting lever.

Williams Wire-Stripping Machine Performs 3 Operations at Once



A wire-stripping machine which cuts, strips and slits one-, two- and three-conductor wire up to ½-in. dia. and can be used for production, semi-production or custom work is now produced by The Williams Products Co., Middletown, Conn. One or all operations can be performed simultaneously.

The Codeco stripper is equipped with the Bellows-Senacon BM5 Air Motor and Norgren 645-2 Lubro-Unit. It measures 18 in. wide, 11 in. deep and 25 in. high. The knives can be changed for other specifications.

Ozalid Streamliner Makes Reproductions in 25 Sec.

The Ozalid Streamliner, a positive-printing, dry-developing machine, which reproduces anything drawn, typed, printed or photographed on translucent material, has been developed by Ozalid, Div. General Aniline and Film Corp., Johnson, N. Y.

With a capacity for 42 in. wide originals of any length, the Streamliner delivers black, blue, red, sepia or yellow reproductions in 25 sec. The prints are delivered dry and ready for use after two internal operations: exposure and dry development.

The Streamliner requires 11 sq. ft. of floor space and is wired for 220 volts ac., 60 cycles, single phase.

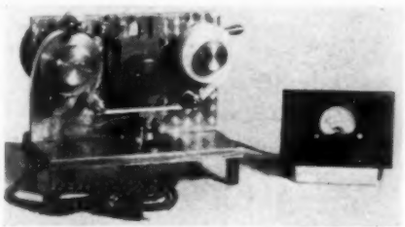
ARC TORCH—Lite-ning torch for use with ac. and dc. welders is produced by Cesco Products, Inc., 30 N. LaSalle St., Chicago 2, Ill. A soft-intense heat with no pressure blow or oxides is said to be characteristic of the carbon-arc flame produced. Aluminum and other metals can be welded, and brazing, soldering, preheating and hard surfacing are possible. One model uses 1/4-in. carbon; a second uses 3/8-in. carbon

Induction Heating Accessory Rotates and Quenches Work

An accessory unit for induction heating which includes a hydraulic rotary spindle and quench ring is produced by Induction Heating Corp., 389 Lafayette St., New York 3, N. Y. The unit is portable and can be held in position at any coil by rubber suction cups.

The work is located on a spindle which is actuated by a water-driven turbine. The speed of rotation is controlled by varying the flow of water. Interchangeable quench rings and adapters are available in four sizes, with inside diameters of 4¾, 7, 9 and 12 in.

Craft Hand-Operated Press Prints Emblems on Plastic



A hot stamp press for printing lettering and emblems on plastic parts has been developed by Craft Machine Co., 57 E. Fifth St., Peru, Indiana. Equipped with thermostatic control, the press has a temperature range from 0 to 600 F. A thermocouple installed in the stamp gives an accurate reading during operation.

The required operating temperature can be reached in 5 to 8 min. and is maintained at a constant level, ± 3 F. The press is hand operated with the printing tape fed on the return stroke. Length of feed can be varied from ¼ to 1¾ in. Stamp and locating fixtures can be adapted to suit the part.

Especially **when producing parts in large quantities**

• Jessop's "Malta" carbide is one of the most versatile of tool and die materials . . . increasing production in hundreds of cutting, drawing, stamping, and other metal working applications. Where wear is a problem, "Malta" carbides will drastically cut production costs in the majority of applications.

It is in the production of small parts in large quantities that the cost-saving features of "Malta" carbides are most quickly realized. For example, the carbide inserted cold header dies shown in the illustration are capable of cold heading thousands of rivets before regrinding is necessary. The longer the production run the more savings multiply.

Our modern production facilities permit us to render prompt service on all carbide applications . . . whether tools, dies, or wear resisting parts. Write on your company letterhead for new 24-page catalogue describing JESSOP'S "Malta" carbide and "T & V" cast alloy.

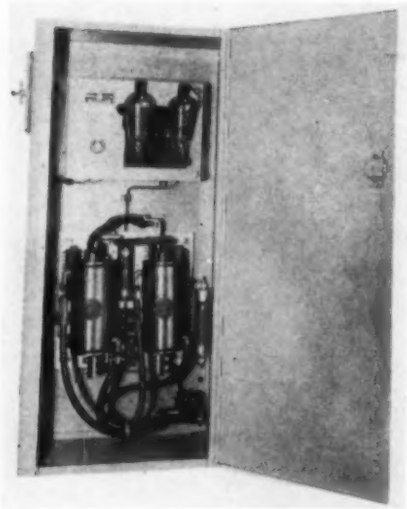
JESSOP STEEL CO.
WASHINGTON, PA.

Triometric Cast Scale Models Used in Making Plant Layouts

Precision-cast scale models for plant layout are produced by Triometric Engineering Co., 1120 Wolfendale St., Pittsburgh 12, Pa. The models are scaled ¼ in. to the foot, and are made for standard or special machines as well as office equipment.

Two-dimensional templets are available which show clearance required under extreme operating and service conditions of the machine and other pertinent data required by the planning engineer.

GE Non-Synchronous Controls Are for Resistance Welding



A line of non-synchronous electronic resistance welding control combinations, designed to meet new NEMA standards, is announced by the Control Div., General Electric Co., Schnectady, N. Y. It includes combinations of ignitron contactors and sequence-weld timers, with or without electronic heat control. Each set of controls is mounted in a single cabinet.

Individual panels are of the same design as those now in use. Ignitron contactors offer high-speed operation and flexibility. Sequence-weld timers give accuracy of timing regardless of normal time voltage variations, because of voltage regulation tubes in the circuit.

The unit is designed for mounting on the right-hand side of the welding machine, but can be placed on the floor or mounted on a wall.

Nicholson Rotary Files and Burs Made in Line With ⅛-in. Shanks

Rotary files and ground burs are now made with ⅛-in. shanks by the Nicholson File Co., Providence, R. I. Designed for delicate operations, they supplement the line with ¼-in. shanks which is now produced.

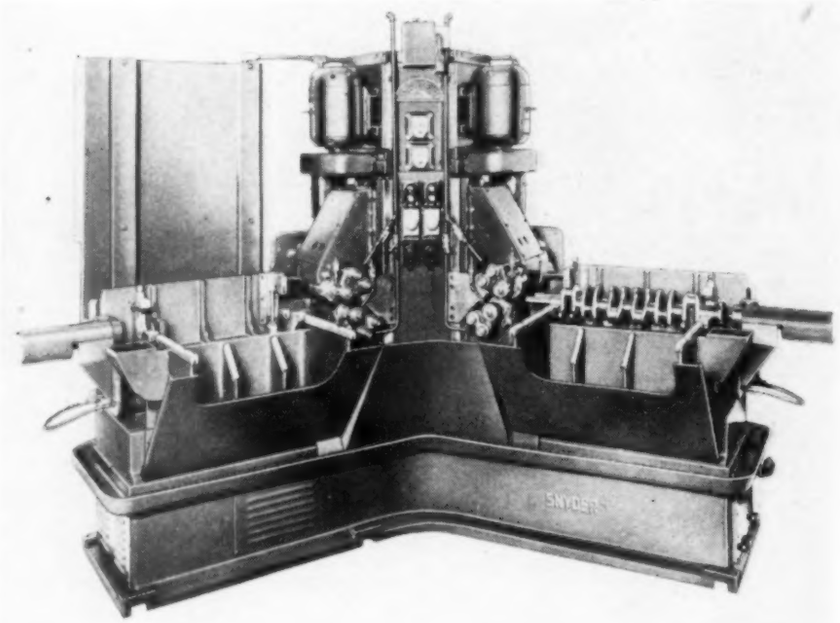
Nine standard styles or shapes are available with head sizes from ⅛-, to ⅝-in. dia. Identification is stamped on the shanks. Assortments of 18 hand-cut rotary files or 18 ground burs are available in a box which serves as a bench stand.

They can be used with portable power tools, drillpress, or flexible shaft at speeds up to twice those recommended for the ¼-in. shank types. The speed in each case is dependent on the diameter of the head or cut section.

Automatic Transportation Trucks Use Neoprene for Drive Wheels

Neoprene tires are announced as standard equipment for the drive wheels of motorized hand trucks made by Automatic Transportation Co., 149 W. 87th St., Chicago 20, Ill. Neoprene will also be available as special equipment for load wheels.

Neoprene is said to have low rolling resistance, and longer service life than crude or other synthetic rubbers. Tests are said to have shown that rolling resistance of the Transporter with neoprene tires was 9% less than synthetic drive and steel load wheels, and 27% less than synthetic rubber all around.



KEYWAY CUTTER—Two keyways are cut in a large crankshaft at each station of this dual automatic keyway cutter designed and built by Snyder Tool & Engineering Co., Detroit, Mich. Operating economies, greater accuracy, and reduction in floor space are said to be achieved by the dual design. Work parts are clamped hydraulically, and loading and unloading is performed at one station while the other is in operation

Our specialty is

high-pressure pumps

not

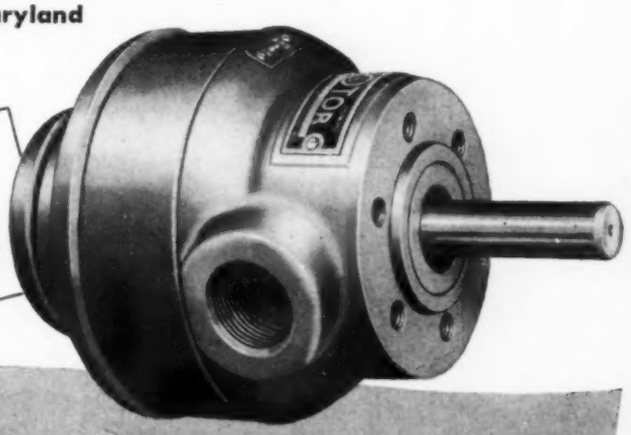
high-pressure selling

Gerotor hydraulic pumps are specified because they deliver sure-fire performance . . . not because we deliver a rapid-fire sales talk.

For example, if your products require hydraulic pumps with operating pressures up to **1500** p.s.i. intermittent, **1200** p.s.i. continuous . . . with a capacity of 3, 5, 8 or 12 g.p.m. . . . the new Gerotor type **QH** is "made to order" for you. Write for folder in which the facts speak for themselves.

You can expect efficient, dependable pumps . . . prompt delivery . . . **and** friendly, helpful service . . . whenever you deal with Gerotor.

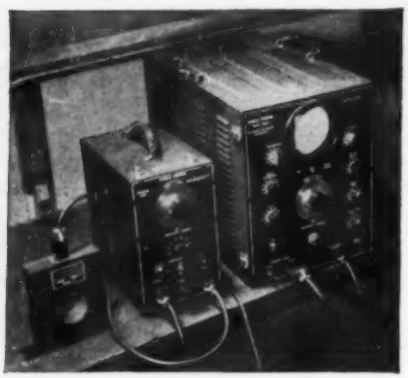
GEROTOR MAY CORPORATION **Baltimore 3, Maryland**



GEROTOR

hydraulic pumps, valves, cylinders

Du Mont's Portable Cable Tester Operates on Core-Loss Principle

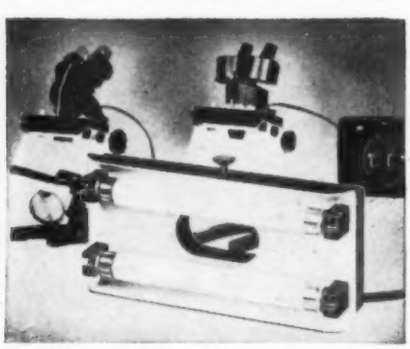


A cable tester operating on the same core-loss principle as the Cyclograph, but eliminating those features not required for testing wire rope, is announced by the Allen B. Du Mont Laboratories, Inc., 2 Main Ave., Passaic, N. J. The equipment is portable, consisting of a main unit and a separate oscillating unit, weighing approximately 110 and 40 lb. each.

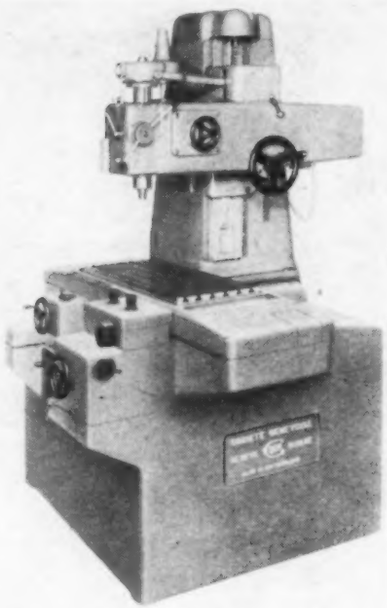
In addition to the instantaneous reading on the oscillograph screen as the cable passes through the test coil, there is a permanent recording means. The meter reading increases as total core losses increase. Proper choice of test frequency and adjustment of the instrument circuit will result in linear meter response with respect to increased stress in the wire rope.

A 110-volt power supply is used. The test coil is connected by a short length of cable to the small oscillator unit, which is connected in turn by 100-ft. cable sections to the main or oscillograph unit.

Miniature Fluorescent Lights Fit Microscopes, Fine Lathes



Miniature fluorescent lights for use on microscopes, jeweler's lathes, or other applications where work on small parts is being done, are produced by Stocker and Yale, 48 Birch St., Marblehead, Mass. The design produces a light intensity of 450 foot-candles at a 2-in. working distance on the model for microscopes, and 550 ft. candles at a 3-in. working distance on the model for other applications.



JIG BORER—The measuring system incorporated in the Hydroptic B has been extended to a smaller machine, the SP jig borer type MP-2H, distributed by the Cosa Corp., 405 Lexington Ave., New York 17, N. Y. The table working surface is 27½ x 12½ in. with settings of the table guaranteed to be accurate in the table slides are viewed by built-in micrometer microscopes reading to 0.0001 in.

Foster Sales Co. Photo Printer Makes Blue or Black Line Prints

A photo printer for blue or black line prints in sizes up to 24 x 18 in. is produced by Foster Sales Co., Royal Oak, Mich.

The printer operates with photoflood bulbs and has a closed compartment in the base to hold paper. It is designed to supplement regular blueprint equipment by providing print-making facilities at various points through the plant.

Edlund of Cortland

In the description of the automatic drilling machine made by Edlund Machinery Co., Inc., published in a recent issue and in the Annual Review, a misprint placed the company in the wrong city. The correct address is Cortland, N. Y.

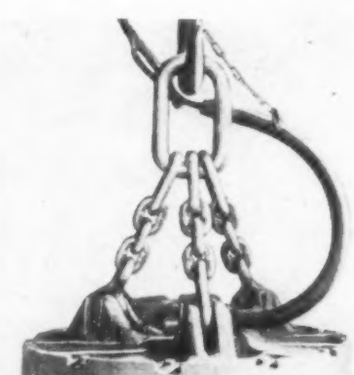
Kennametal Solid Squares Made for Precision Boring

A line of solid Kennametal squares, style SS, is now available from Kennametal, Inc., Latrobe, Pa. The squares are bottom-side diamond ground with a 10° formed angle at one end, and are for precision boring of cast iron, steel, and non-ferrous metals.

Made from Kennametal Grade K5H, catalog sizes include ¼x¼x 1¼ in., 5/16x5/16x1½ in., and ⅜x⅜x1 1/3 in.

New England Carbide Tool Drills For Masonry Have Deeper Flutes

Improvements are announced in the carbide-tipped Cyclone drills for masonry work which are made by New England Carbide Tool Co., Cambridge, Mass. Deeper flutes permit cuttings or powder residue to escape more freely. The construction permits larger shanks and gives minimum overhang of the carbide tips for better tip support.

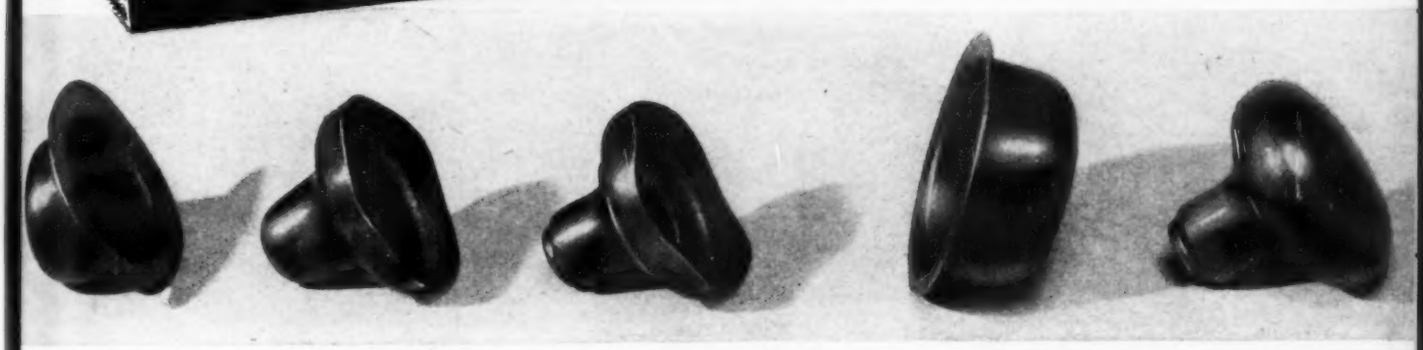


MAGNET CHAIN—Triple magnet chain has 60° twist in two of the three connecting links which keep links of the legs perpendicular and reduces wear caused from gouging and kinking. Built by S. G. Taylor Chain Co, Hammond, Ind., the chains are built of special alloy steel

CARBOLOY (TRADEMARK) CEMENTED CARBIDE SHEET METAL DIES

Step up Die Life 10 TO 1 OVER STEEL DIES

In the manufacture of Metal Door Knobs for PACIFIC PLASTICS and MANUFACTURING COMPANY... maker of "Hollymade" Hardware



Successive steps in punching out metal door knobs by Pacific Plastics and Manufacturing Company

When Pacific Plastics and Manufacturing Company, fabricators of "Hollymade" Hardware, shifted from steel dies to Carboloy Cemented Carbide Dies for punching out metal door knob parts, here's what happened:

Die Life increased 10 times! (And at latest reports, these dies had not yet required grinding or polishing!)

That's money saved, time saved, production increased. And many other important advantages follow the change-over to Carboloy Cemented Carbide Sheet Metal Dies. For example—

Closer tolerances on drawn parts—fewer "rejects"—lower cost per piece—virtually mirror-smooth surface finish, with big reductions in buffing time—and sizeable increases in output-per-press.

• • •

If a letter of inquiry could lead to results like these in *your* plant, wouldn't you consider it time well spent? Why not write *today*—you'll receive by return mail our Booklet D-120, containing facts and figures that may start the ball rolling to big production improvements in *your* plant.

CARBOLOY COMPANY, INC.; 11143 E. 8 Mile Blvd., Detroit 32, Mich.

CHICAGO • CLEVELAND • DETROIT • HOUSTON • LOS ANGELES • MILWAUKEE
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CARBOLOY (TRADEMARK) CEMENTED CARBIDE SHEET METAL DRAWING AND BLANKING DIES

INCREASE OUTPUT
EXTEND DIE LIFE
HOLD CLOSE TOLERANCES
REDUCE "REJECTS"

Parts and Materials

Shield-O-Matic Coated Electrode Flexible for Automatic Welding

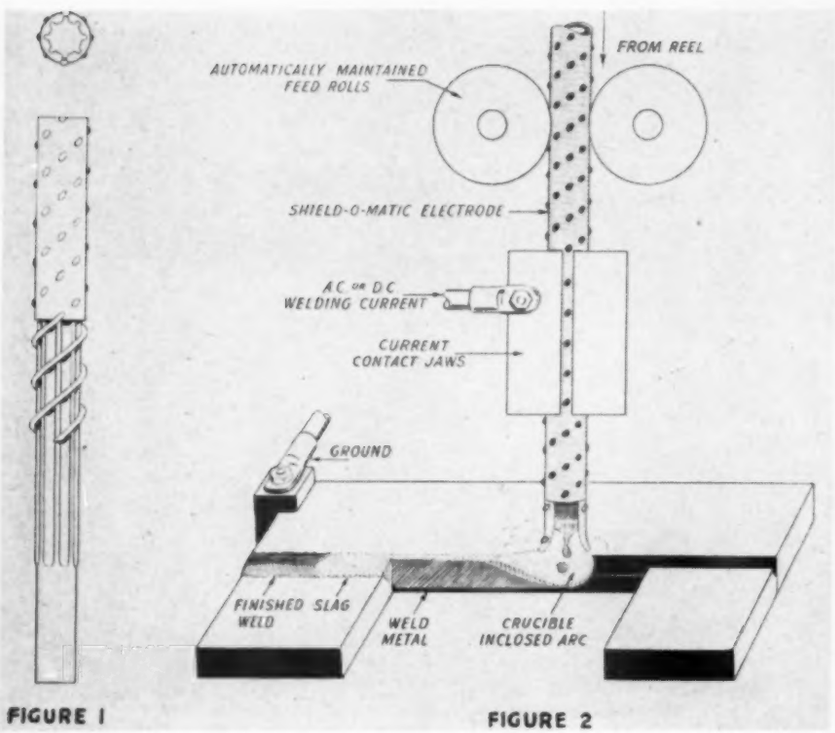
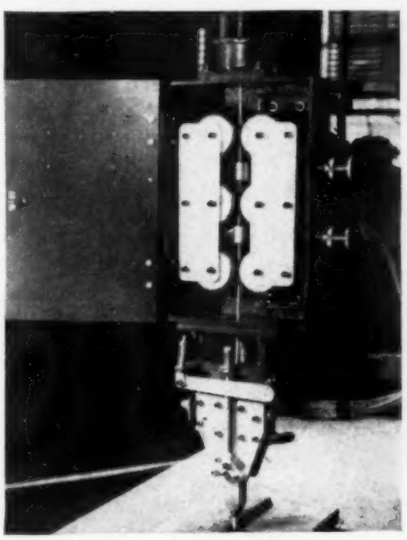


FIGURE 1 FIGURE 2

Flux is held to the wire by grid construction. Current is conducted through the flux to the core by the wires of the grid, which protrude at intervals

Four stages in processing the Shield-O-Matic electrode: the plain core rod, surface of the rod deeply grooved, rod wound with fine wires, and the completed electrode with flux



Standard adapter for feeding the electrode has six rubber-faced feed rolls. This adapter can be used with any standard automatic welder

Welding 1-in. plate. Flare is minimized by the crucible-inclosed arc which is formed by the electrode

An automatic welding electrode that is said to combine the advantages of manual shielded-arc welding and continuous automatic welding has been developed by Hollup Corp., Div. of National Cylinder Gas Co., Chicago, Ill. Called the Shield-O-Matic electrode, it has a metallic-grid construction binding the flux coating to the core wire. It is said to stand extreme flexing without losing flux, and can be fed into the arc from a reel.

Unusually high welding currents can be used because of the finned construction of the core, increasing the rate of melting of the electrode, but not the temperature of the molten metal.

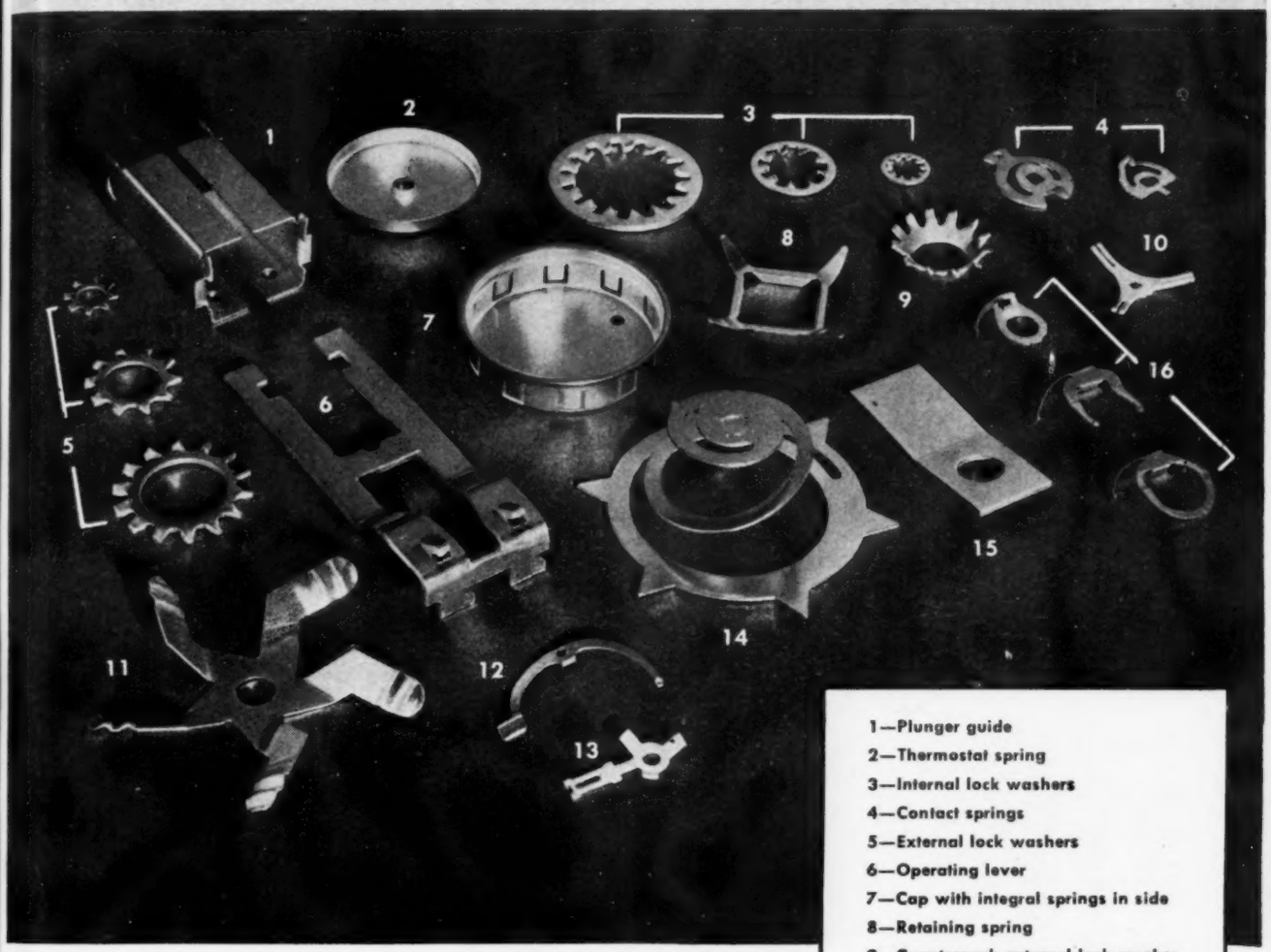
The retarded rate of consumption of the flux, compared with the core, forms a crucible about the upper part of the arc. The heat of the arc converts most of the flux to gas which leaves the crucible with sufficient force to move the molten base metal from under the arc, forming a mating crucible (see Fig. 2).

In a demonstration at the plant, two ¼-in. plates were butt welded with a 5/32-in. electrode. The welding current was 400 amp. and the welding head traveled at 33 ipm. An excellent joint was obtained. It is said that welding speeds as high as 72 ipm. have been obtained.

The welds produced are said to have high strength and ductility. Uniform welds are obtained because of the uniform rate of fluxing. At present the electrodes will be produced for welding low and medium carbon steel and low-alloy, high-strength steels.

REVERE PHOSPHOR BRONZES

OFFER MANY ADVANTAGES



1—Plunger guide
2—Thermostat spring
3—Internal lock washers
4—Contact springs
5—External lock washers
6—Operating lever
7—Cap with integral springs in side
8—Retaining spring
9—Countersunk external lock washer
10—Pressure spring for capacitor
11—Five-contact spring
12—Contact spring for radio part
13—Pressure spring and terminal
14—Involute spring
15—Contact point for solenoid
16—Contact springs
—made of Phosphor Bronze strip supplied by Revere

STRENGTH — Resilience — Fatigue Resistance — Corrosion Resistance—Low Coefficient of Friction—Easy Workability—are outstanding advantages of Revere Phosphor Bronzes, now available in several different alloys.

In many cases it is the ability of Phosphor Bronze to resist repeated reversals of stress that is its most valuable property. Hence its wide employment for springs, diaphragms, bellows and similar parts. In addition, its corrosion resistance in combination with high tensile properties render it invaluable in chemical, sewage disposal, refrigeration, mining, electrical and similar applications. In the form of welding rod, Phosphor Bronze has many advantages in the welding of copper, brass, steel, iron and the repair of worn or broken machine parts. Revere suggests you investigate the advantages of Revere Phosphor Bronzes in your plant or product.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y.—Sales Offices in Principal Cities, Distributors Everywhere.

•

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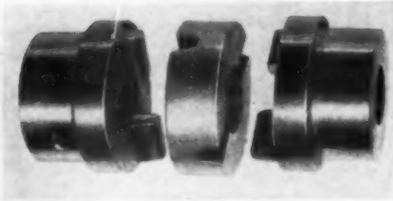
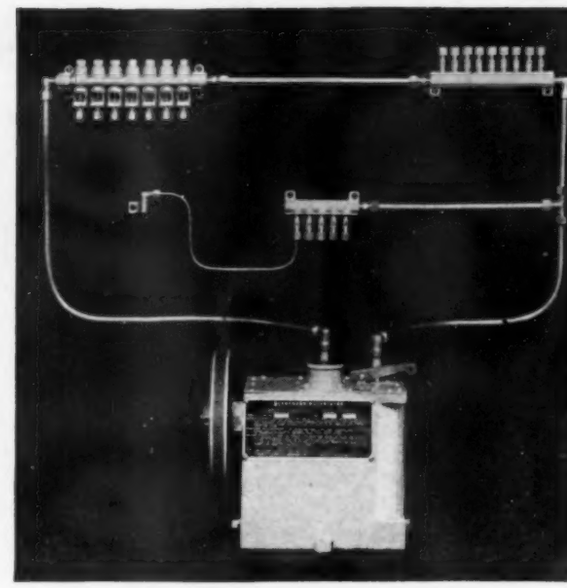
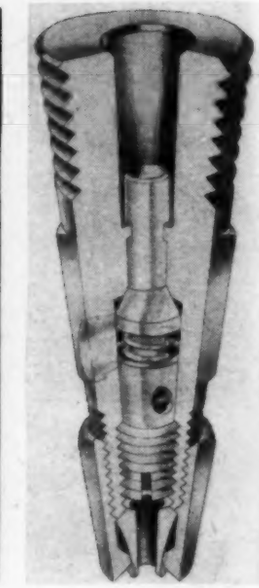
Gear-Tooth Design Principles Used in IMW Flexible Coupling



A flexible coupling featuring two identical end pieces with involute gear-teeth which mate with a centerpiece containing rack grooves running transversely on opposite sides has been developed by Industrial Machine Works, Inc., South Hanover, Mass. The design provides simultaneous automatic correction for angular and parallel misalignment.

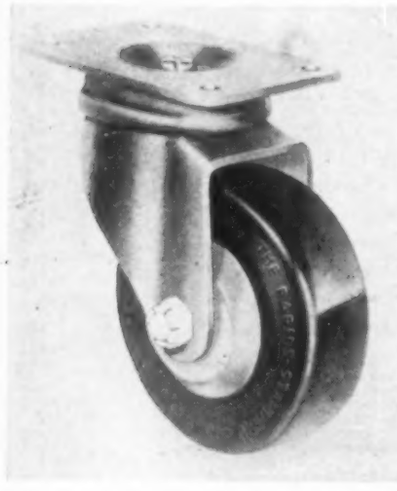
The couplings have a torque capacity to 1500 in.-lbs. in standard sizes up to 1 1/3-in. shaft dia. The centerpiece is lubricant-impregnated sintered bronze. Tailor-made units will be available.





LUBRICATION SYSTEM—Improvements have been made in the Pulsolator automatic oil lubricating system, produced by Lubrication Div., Rivett Lathe & Grinder, Inc., Brighton, Mass. The system can be engineered to provide controlled oil delivery by gravity or under pressure to selected bearings while, at the same time, it directs continuous flood lubrication to inclosed bearings and gear trains. Systems can be designed to lubricate from 1 to 400 individual bearings. Oil is circulated in a continuous flow through the supply line, periodically building up high pressure. Frequency of this can vary from once every 3 sec. to once every 12 min., and feeders can be adjusted to deliver 1 to 3 drops on each pressure surge

Rapids-Standard Begins Light- And Medium-Duty Caster Series



The "Scout" formed caster for light- and medium-duty service on light trucks, dollies and other portable equipment has been released by The Rapids-Standard Co., Inc., 308 Peoples National Bank Bldg., Grand Rapids 2, Mich.

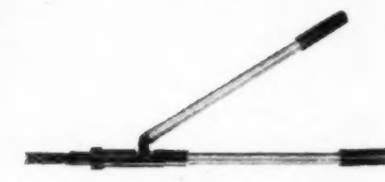
A special feature of the caster is a deep-drawn upper-raceway swivel-bearing cup design which provides longer life and freedom from dirt. Capacity of casters, which may be equipped with either hard- or soft-tread molded-rubber 3½ in. wheels, varies from 125 to 250 lbs. Over-all height is 4 11/16 in.

Weltronic Shunt Motor Control Built for Machine-Tool Drives

An electronic motor control for dc. shunt-wound motors up to ½ hp. is produced by Weltronic Co., 19500 W. Eight Mile Road, Detroit 19, Mich. Designed for applications where automatic compensation for changing load and changing line voltage is not required, the unit is said to be less expensive than previous models, yet includes necessary features for motor drives on lathes, milling machines, and other machine tools.

Operating on 230 volts ac. single phase, the motor control has an output for 230-volt dc. motors. Armature voltage is continuously variable for speed control. Field voltage remains constant.

Large Blind Rivets Installed With Cherry's G-55 Hand Gun



A rivet hand gun operating on the ratchet principle and especially designed for jobs entailing small quantities of large Cherry blind rivets (7/32, ¼ and 9/32 in.) has been announced by Cherry Rivet Co., 231 Winston St., Los Angeles 13, Cal.

The gun is 29 in. long, including pulling head, and weighs 4½ lbs. complete. When used with an adapter, it also can install smaller rivets.

FREE LITERATURE

New Catalogs, Booklets, Bulletins

(Not good after April 1, 1947)

MACHINES AND ATTACHMENTS

1 BENDERS, SHEARS, BRAKES—O'Neil-Irwin Mfg. Co., Lake City, Minn. 40-page catalog 46-11 describes and illustrates Di-Acro benders, shears and brakes, and their use in reproducing parts in small quantities.

2 CUT-OFF MACHINES—A. P. de Sanno & Son, Inc., Phoenixville, Pa. Folder describes high-speed Radiac cutting machines which feature interchangeable flanges to permit maximum disk wear, adjustable valves controlling coolant flow in wet-cutting machines, motorized centrifugal pumps for circulation, and dust- and spray-proof drives.

3 CALCULATOR — Dries & Krump Mfg. Co., Chicago, Ill. Slide-rule for computing cutting sizes of sheet steel with allowances for 90° bends, pressure for right-angle bends in mild steel, and punching pressures.

4 PIPE BENDER — Watson-Stillman Co., Roselle, N. J. 8-page bulletin W-S A-7 on hydraulic pipe bender covers capacity, construction and maintenance features. Bender is portable, has 9½-in. stroke.

5 LATHE—The Hendey Machine Co., Torrington, Conn. 10-page catalog 924-946 describes and illustrates 9- x 24-in. tool- and gage-makers' lathe. Features stepless spindle speeds, 40 to 2000 rpm., forward and reverse, and 66 thread-cutting and feed changes without gear change.

6 DIE-CASTING MACHINE — Light Metal Machinery, Inc., Cleveland 13, Ohio. 6-page bulletin describes zinc, lead and tin die-casting machine and shows how cycling mechanism provides automatic injection, dwell and ejection. Speeds are 240, 330, 520 and 720 shots per hour.

7 SCREW MACHINE—The Monarch Machine Tool Co., Sidney, Ohio. 20-page bulletin 1901 describes "Speedi-Matic" hand-operated screw machine with two ranges of infinitely variable spindle speeds and a top of 5000 rpm. Speeds are electronically pre-selected and controlled.

8 TUBE-END FORMING—Vaill Engineering Co., Waterbury 89, Conn. 4-page bulletin G-1 describes line of machinery for cold forming and shaping tube ends to close tolerances.

9 TRANSFER MOLDING — Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y. 8-page booklet "Transfer Molding Pressures" on pressure phase of transfer molding includes formulas for calculating pressures and molding areas.

10 TOOL GRINDER—K. O. Lee Co., Aberdeen, S. D. 8-page bulletin describes and illustrates Universal carbide tool grinder and applications to forming single-point tools, grinding angular and straight chip breakers, and grinding small boring bits and flat form tools.

TOOLS AND ACCESSORIES

11 WRENCHES—The Billings & Spencer Co., Hartford 1, Conn. 28-page catalog W-48-2 covers line of "Vitalloy" wrenches. Lists engineers', box, open-end, electrical, detachable-socket, check-nut, set-screw, structural, T-handle, and car wrenches among others.

12 MILLING ATTACHMENTS — National Machine Tool Co., Cincinnati Ohio. 20-page catalog 16 "National Key Seating Millers and Oil Grooving Millers" describes and illustrates attachments principally used in drillpress. Lists speeds and feeds.

13 TOOLS — The Ready Tool Co., Bridgeport 5, Conn. 24-page catalog 46 contains information and data on ball-bearing centers, carbide-tipped centers, high-speed centers, lathe and grinder dogs, boring bars, toolholders and accessories.

14 INTERNAL COMPARATOR — The Comtor Co., Waltham, Mass. 8-page bulletin 33 describes "Comtorplug" shock-absorbing internal comparator with 2-point gaging with interchangeable amplifier. Each plug measures one size hole within range ±0.005 in.

15 HARDNESS TESTER—Ames Precision Machine Works, Waltham 54, Mass. 4-page bulletin describes Ames hardness tester and contains conversion chart of Rockwell-Brinell hardness numbers. Tester weighs less than 2 lb., tests flats and rounds up to 1 in.

16 TOOLS—New England Carbide Tool Co., Inc., Cambridge 39, Mass. 20-page bulletin lists carbide lathe tools, cut-off tools, boring tools, reamers, centers, dies, plug gages, diamond tools, masonry drills, contact points and ring gages.

17 DRILLS—Republic Drill & Tool Co., Chicago 7, Ill. 4-page bulletin RM-1 describes new line of mechanics'-length high-speed drills which are 15% shorter than Republic's conventional jobbers'-length drills.

18 GRINDING WHEELS — The Blanchard Machine Co., Cambridge 39, Mass. 4-page bulletin 253 covers three types of Blanchard wheels—cylinder, sectored and segment—which are used with various Blanchard surface grinders.

19 CUTTING TOOLS—Jessop Steel Co., Washington, Pa. 24-page catalog lists "Malta" carbide-tipped tools. Also covers carbide dies, cast-alloy toolbits, and special tools.

20 DRILL INDEX—Huot Mfg. Co., St. Paul 1, Minn. 2 folders covering Huot all-steel drill indexes to hold drills. Made in 9 sizes for drills ranging from No. 80 to 1 in.

21 DIES—Dreis & Krump Mfg. Co., Chicago 36, Ill. 128-page book "Forming Press Dies" describes and illustrates practical forming press dies with special information for operators. Dies are adaptable to standard press brakes. Data included for computing bending allowances and pressures, and punching pressures.

22 DRILLS—Whitman & Barnes Div., United Drill and Tool Corp., Detroit 16, Mich. 202-page catalog 100 describes regular line of tools plus new tools including drills, drill sets, reamers, and interchangeable counterbores and sets.

HEAT-TREATING AND WELDING

23 WELDING MACHINES — Sciaky Bros., Inc., Chicago 38, Ill. 30-page bulletin 130-A gives characteristics of flash welds, describes and illustrates Sciaky flash-butt welders, and features clamps, frames, hydropneumatic boosters and electronic timers.

24 ELECTRIC FURNACES — The Sentry Co., Foxboro, Mass. 12-page bulletin 1054 describes Sentry Model "Y" electric furnaces and the Sentry Diamond inner-furnace lining block method of atmospheric control. Furnaces insulated for temperatures to 2500 F.

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25 HEAT-TREATING DATA — Sunbeam Stewart Industrial Furnace Div., Sunbeam Corp., Chicago 23, Ill. 72-page booklet "Vest Pocket Heat-Treating Data Book" contains specifications, types of furnaces, heat-treating practice, and other data.

26 WELDING AND CUTTING—Air Reduction Sales Co., New York 17, N. Y. 64-page catalog describes oxyacetylene cutting and welding gases, supplies and equipment, and contains price lists.

27 LOW-TEMPERATURE WELDING—All-State Welding Alloys Co., Inc., White Plains, N. Y., 32-page booklet discusses economies of low-temperature welding and lists All-State welding rods, galvanizing powder, brazing compound and fluxes.

28 INDUCTION HEATING — Ajax Electrothermic Corp., Trenton 5, N. J. 8-page bulletin 27 "Melting and Heating by High Frequency" discusses principles of Ajax-Northrup induction furnace and provides data to aid equipment selection.

PLANT SERVICE EQUIPMENT

29 EYE PROTECTION—Welsh Mfg. Co., Providence 9, R. I. 16-page catalog 46 lists chippers' and welders' goggles, spectacle goggles, fog-free goggles, face shields and welders' helmets. Absorptive protective glass and polaroid non-polarizing plastic lenses are featured.

30 DROP TABLES — Whiting Corp., Harvey, Ill. 36-page catalog DT-C-403 describes and illustrates modified designs, construction, operation and accessories of Whiting drop tables with suggestions for pit construction and track layout in steam-, diesel-, and electric-locomotive shops.

31 GRID HEATERS—D. J. Murray Mfg. Co., Wausau, Wis. 12-page catalog describes "Grid" unit heaters and explains how they furnish "aimed" heat. Heating sections are one-piece, cast-iron units.

32 PROTECTIVE CLOTHING—The B. F. Goodrich Co., Akron, Ohio. 10-page booklet describes and illustrates protective work-coats, aprons and hats. Materials are rubber or plastic for specific needs.

33 WORK TABLE—Island Equipment Corp., New York 17, N. Y. 8-page bulletin PF-8 describes "Unitables," all-purpose conveyor, mechanized work table for assembly, inspection and packing operations. They are 10 ft. long and standard belts are 12 in. wide.

PARTS AND MATERIALS

34 CALCULATOR—D. A. Stuart Oil Co., Chicago 25, Ill. "Dilut-O-Graph" circular calculator computes amount of base oil to use when given proportions and tank capacity. Calculator is 4½ in. in diameter.

35 COOLANT PUMPS — Cameron Pump Div., Ingersoll Rand, New York 4, N. Y. 24-page booklet covers foot-, immersion-, and sidewall-type circulating and coolant pumps. Includes suggestions on selection of proper type.

36 STEELS—Joseph T. Ryerson & Son, Inc., Jersey City 3, N. J. 244-page catalog "Ryerson Steels." Stock list includes new grouping system for bar shapes, structurals, hot-rolled steels and cold-finished steels.

37 AIR VALVES—Valvair Corp., Akron 11, Ohio. 4-page bulletin describes and illustrates Valvair air-control valves. Cross-sections of two-way, three-way, and four-way valves indicate open, closed, and exhaust positions.

38 CENTRIFUGAL PUMPS—Worthington Pump & Machinery Corp., Harrison, N. J. 8-page bulletin W-341-B11 gives dimensions of Worthington centrifugal pumps and includes information on cooling systems, assembly, lubrication and mounting.

39 HYDRAULIC POWER—Hydraulic Machinery, Inc., Dearborn, Mich. 10-page bulletin describes and illustrates "Hymac" hydraulic power units which can be applied to movements including milling, grinding, riveting and pressing. Features 40-hp. unit for pressures up to 5000 psi.

40 ALLOY STEELS—The Carpenter Steel Co., Reading, Pa. 10-page booklet "2 Steels Simplify Your Alloy Needs" describes two chrome-nickel alloy steels and includes working instructions, physical properties, and stock sizes.

41 AIR MOTORS—Bellows Senacon Co., Akron 10, Ohio. 8-page bulletin gives design features, standard and special stroke-lengths, and dimensional drawings of Bellows air motors.

42 COUPLINGS — Philadelphia Gear Works, Inc., Philadelphia 34, Pa. 10-page bulletin 150 describes and illustrates Philadelphia couplings, including flexible, thermoid-type, steel-flanged, and gear couplings.

43 PRESSURE CASTING—Mechanite Metal Corp., New Rochelle, N. Y. 12-page bulletin 10 "Mechanite—the Metal for Pressure Castings" covers applications of castings to high pressure work. Includes microphotographs and modulus-of-elasticity and strength values.

44 CIRCULAR PRODUCTS—Bethlehem Steel Co., Bethlehem, Pa. 31-page booklet 216 describes and illustrates rolled and forged circular products including turbine rotors, flywheels, brake drums, gear blanks, mine locomotive wheels and crane wheels.

45 INDUCTION MOTORS — Century Electric Co., St. Louis 3, Mo. 8-page bulletin 643 describes slip-ring induction polyphase motors with illustrations of stators, rotors, bearings and brushes, and mechanical forms.

46 BALL BEARINGS—New Departure Div., General Motors Corp., Bristol, Conn. Book is third design manual in series on ball bearings and discusses enclosure and lubrication. Parts I and II on bearing types and mounting practices also available upon separate request.

47 PULSING DRIVE — Yardeny Laboratories, Inc., New York 7, N. Y. 6-page bulletin describes "Pulsing Drive," a selective, pulsating, single-knob, switching device used in control of electric motors and magnetic valves.

48 MARKING TOOLS—M. E. Cunningham Co., Pittsburgh, Pa. 6-page folder describes "Utility" holder which comes in 9 sizes. Each holder can hold 9 sizes of type.

49 COLLOIDAL GRAPHITE—Acheson Colloids Corp., Port Huron, Mich. 16-page booklet describes "Dag" colloidal graphite with information on properties, applications, and dispersion in water, oil, alcohol and hydro-carbons.

50 ROTATING ELECTRICAL EQUIPMENT — Electric Specialty Co., Stamford, Conn. 8-page catalog 46-1 includes descriptions of "Esco" motors for special applications, dynamotors and converters, a.c. and d.c. generators, and motor-generator sets. Data on ranges and characteristics.

51 SOLUBLE OIL—Oakite Products, Inc., New York 6, N. Y. 20-page booklet describes uses of Oakite soluble oil and gives information on mixing procedures, precautions and additional agents.

52 REMOTE CONTROL SYSTEMS —Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. 12-page bulletin 14B641 "Direct-Current Remote Indication & Control Systems" discusses applications, construction, workings, specifications and dimensions.

53 REMOTE CONTROL MOTOR — Transicoil Corp., New York 13, N. Y. 2-page bulletin describes and illustrates 60-cycle, 2-phase "Servo-Motor" for remote-control uses. Graphic performance chart included.

54 MACHINE DRIVES—The Master Electric Co., Dayton 1, Ohio. 8-page bulletin illustrates applications of "Master-drives." Units replace line shaft and belting, include worm-reduction drives, variable-speed drives and single parallel gearhead motor drives.

MISCELLANEOUS

55 CENTRIFUGAL CASTINGS — Ampco Metal, Inc., Milwaukee, Wis. 4-page bulletin 53A discusses advantages of centrifugal casting with emphasis on grain growth.

56 METAL CASTINGS—The Advance Foundry Co., Dayton 3, Ohio. 8-page bulletin illustrates "Strenes Metal Castings." Includes dies and parts such as impellers, bushings and melting-pots.

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ROUND TABLE Discussion

IS RABBLE ROUSING WORTH A PREMIUM?

The rabble rouser is not a cause; he is an effect. Voluntarily remove the cause and the effect will be one more rabble rouser out of a job. On the other hand, if you wait till public clamor, fanned and inflamed by the rabble rouser, compels his removal, you simply give a free advertisement to him which he and his following can only regard as a vote of confidence and encouragement.

Catch while they are "young" those complaints by the shop steward, that growl about bad ventilation and poor lighting, the ratefixer's tendency to base prices on the performance of the known speed merchants, high-up partiality to the wife's brothers and half brothers, and more too numerous to cite. If that procedure is followed, the sheep complaints can be separated from the goatgetters and just as easily dealt with. If there is substance in a complaint, it should be treated as if the complainer had rendered the management a personal service (as indeed he has), and immediate steps should be taken to apply the necessary corrective. If the complaint is flimsy or trivial, the grouser will no more be able to sell it than would a salesman a dud product.

It is a very human weakness to look for something for nothing and we mostly tend to lean towards those silver-tongued charlatans who, with every show of confidence, promise us just that. We are gamblers by nature, since life itself is something of a gamble. In so many cases, the accident of birth makes so much difference. Could we but choose our own parents, how many of us would be content to live in slumland? Many ingenious people work so hard trying to live without working, by devising ways and means of getting something for nothing.

There is a lot of wisdom in "Ed's" contention that union bosses should share the workers' discomfort of a strike when they call or endorse one. In extreme circumstances, a strike is justified—but only in extreme circumstances when all known conciliatory means have failed. A union boss's job is to improve his members' lot, while keeping them free from

strikes if humanly possible, just as a doctor's job should be preventive in the matter of illness.

No union boss can, of course, *compel* an employer to agree to his proposals if the right to call a strike is denied him, but if he is a good salesman he may be able to persuade him to buy them. If agreement cannot be reached and the union boss is satisfied that a strike cannot be avoided, then I agree with Ed that he should go on strike pay for the duration.

E. D. Mackinnon
Lanarkshire, Scotland

•

ROLLING STONES

Having been afflicted with the same wandering bug as John Tobias, it behooves me to get my pen out of retirement and exercise it in his defense. I have associated with many such globe-trotting "Johns" in my lard-oil-smelling days and have the highest respect for their courage, adaptability, and efficiency.

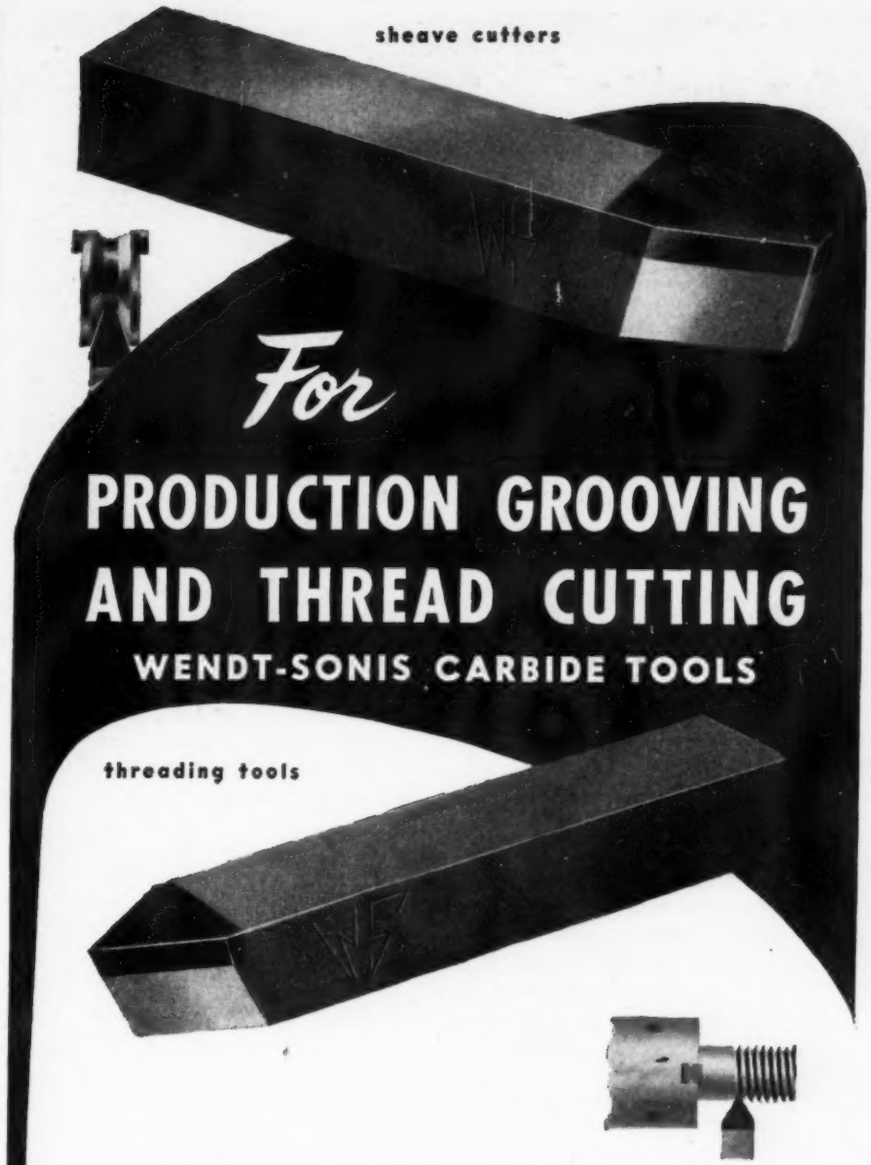
However, I worked on the same bench as one "phoney" who spent six weeks on an intricate piece of machinery before the over-burdened foreman got wise to him. Needless to say he was quickly called on the carpet and had the inglorious can tied to the extreme portion of his swaggering anatomy. Whether this conscienceless, experience-seeking hijacker gained anything by his deception or not, the fact remains that he took in many of the firm's valuable dollars and wasted a pile of good material.

One acquaintance of mine, a superb workman and as full of yarns as an old salt, piled the tools in his weather-worn toolbox, slammed down the lid, and asked for his time so often that I thought sure he was out for the last time. Lo and behold, after a lapse of six months, he approached the foreman, withdrew the high-priced perfecto from his mouth, and smiled, "What d'ya say, Bill?"

The foreman stuck out a hand of welcome and frowned. "C —— sake; are you back again?"

Needless to say the man was hired once more because he brought back with him every time hundreds of dollars worth of constructive ideas that he had received while in the services of another employer.

It has been my observation that men of peripetic "John's" type are well-meaning philosophers at heart; they have an inveterate love of life and are extremely allergic to a monotonous existence. They like the scenery to change often. They



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prove, as a general rule, to be gilt-edged workmen having acquired valuable experience and money-saving ideas during their perambulations. Invariably the hiring of one of these mechanical-minded gypsies injects the old timers and stick-in-the-muds with a few grains of energetic vitamins because, when he hires out, it is for the purpose of turning out work until he suffers his periodic spell of ennui that shoves him on. For that reason alone it is not bad psychology to hire a dependable "John" and let him act as a catalytic agent for the slow-moving "chemicals" who through complacency are prone to sleep on the job.

Many a "Rolling Stone" will blame his egregious habit of changing jobs on his love of tonsil-cooling refreshments. After a lengthy sojourn on the proverbial water-wagon he suddenly plunges into the alcoholic Styx, then, rather than eat humble pie, following his hangover, he gathers up his few cherished belongings and hies himself to other fields.

In my early years I hadn't the patience to last out the fourth year of apprenticeship and "pulled out" for more profitable pastures. Life to me was one hop, skip, and jump for several years until a good-looking red head injected me with a considerable amount of conservatism. (Then's when I became a Republican!) This staid characteristic soon cooled and the "call-of-the-wild" became irresistible. Any chance that presented a change, regardless of the number of little redheads in my family, or the necessary miles I had to travel between jobs, I took advantage of—in spite of the deficit. My motto is—and you'll find that this holds with many other "Wandering Johns"—that we have only one life to live on this cock-eyed earth, so why throw out the anchor of monotony when sailing the thrilling high seas of variety is so delightfully pleasant?

I think that Al's appraisal values are good. If I had my say, I would inject the switching idea into the whole manufacturing setup and have the apprentices booted out of their comfortable, downy nests, after a period of about three years, with a stern admonition that they go out and really learn, accumulate sufficient experimental callouses and social guts, then return to their happy homes with flying colors to receive a bronze star of human understanding and a gold-sealed certificate of proficiency.

J. Homewood
Ontario, Calif.

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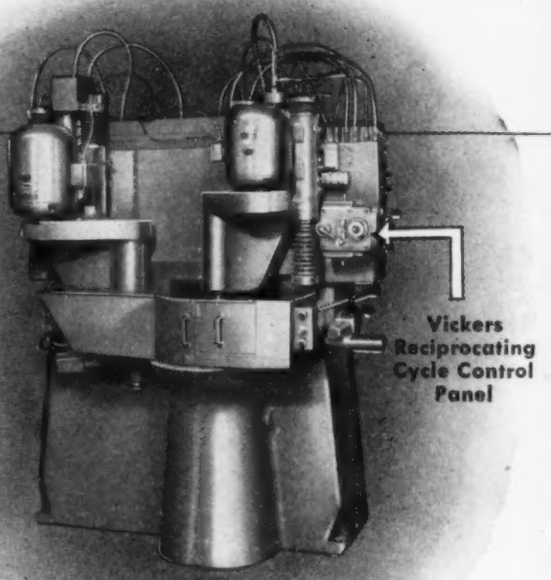

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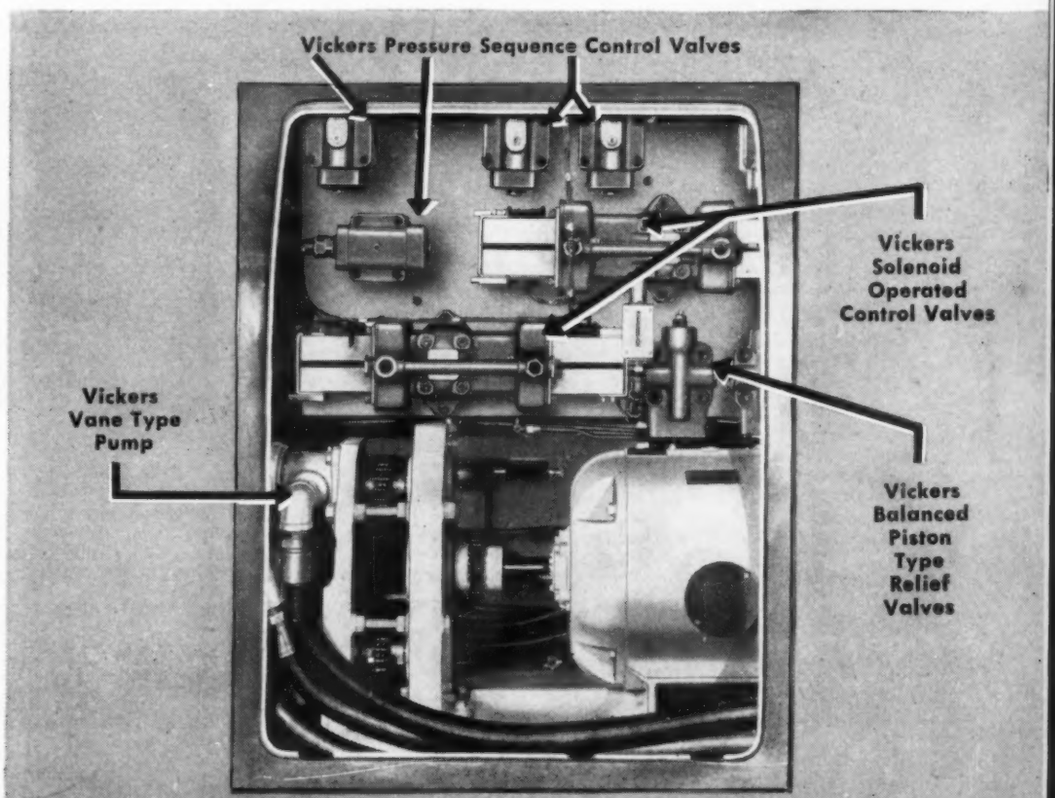
Vickers Pressure Sequence Control Valves
Vickers Solenoid Operated Control Valves
Vickers Vane Type Pump
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Rear View of Springfield Grinding Machine with Cover Plate Removed

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THE TECHNIQUE OF EXECUTIVE CONTROL—*By Erwin Haskell Schell, professor of Business Management, Massachusetts Institute of Technology. 270 pages. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. Sixth Edition. Price $2.00.*

Intended as a guide to executive straight-thinking, this book offers a constructive analysis of executive conduct, suggests new avenues of reflection and aids in building executive method. Interspersed with the text are many questions that serve to amplify, qualify or present case studies of textual content. It is the author's contention that correct answers to these questions will vary according to personalities involved and that the reader will benefit most from working out his personal approaches to solution.

Besides covering executive tools, control, stimulation, duties, collaboration, difficulties with subordinates, associates and superiors, proficiency and recommended reading, two new chapters on executive attitude and morale and executive public relations have been added.

The discussion on executive attitude and morale is based on the need for effective executive, employee relations and recognition of individual characteristics. Public relations has been treated in the sixth edition, because it is increasingly important in modern industry. Suggestions are given to guide executives in their conduct with employees as well as other groups directly or indirectly interested in actions and welfare of their organization.

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MODERN PRACTICAL ACCOUNTING *(Two volumes, Elementary and Advanced). By Dr. Earl A. Saliers, C.P.A., professor of Accounting Louisiana State University, Published by American Technical Society, Drexel Ave. & 58th St., Chicago 37, Ill. 365 pages (each volume), 5½ x 8¼ in. Price $3.50 each.*

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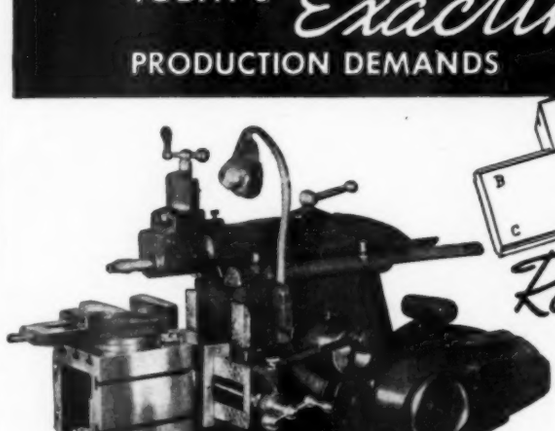

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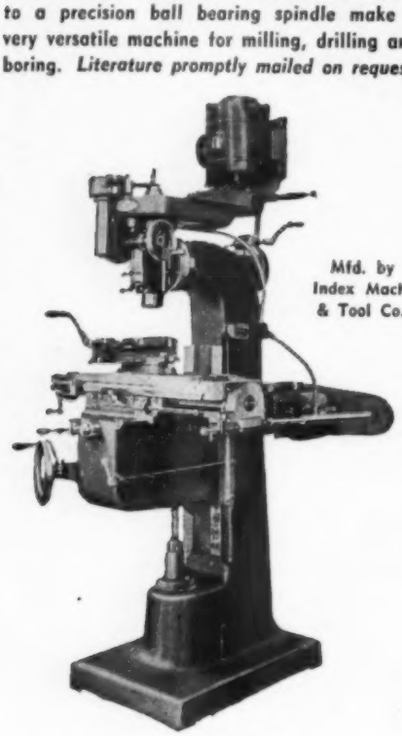

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Practicality is the keynote of this book. It does not duplicate or replace any of the many books with similar titles; rather, it offers countless practical, everyday problems in shop mathematics for the machinist, toolmaker, and mechanical engineer, then shows the solution in its simplest form. Most shop problems are tangible and therefore geometric. The examples herein contained involve the use of plane and solid geometry together with numerical shop trigonometry and analytic trigonometry. There are 100 pages of natural and logarithmic trigonometric tables at the end of the book, which, with the style of text presentation, make it useful as a handbook of practical mathematics.

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TRIGONOMETRY REFRESHER FOR TECHNICAL MEN—*A. Albert Klaf, B.S., M.E. 629 pages. Published by The McGraw-Hill Book Company, 330 W. 42nd St. New York 18, N. Y. $5.00.*

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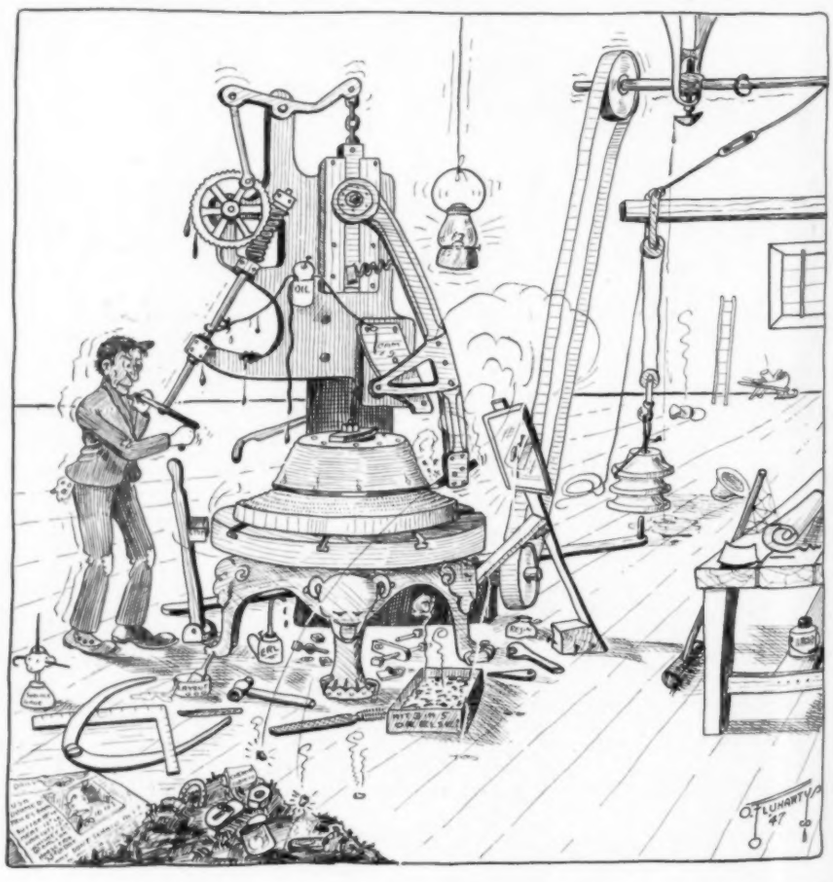

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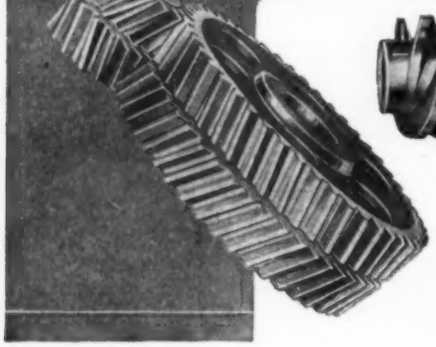

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4. Are *all* spiral flutes the *same depth* and *length?*	☐	☐
5. Can you maintain *uniform* shape and size of flute?	☐	☐
6. Do you get positive rake the full length of spiral flutes?	☐	☐
7. Can you also grind the full length of the straight flutes?	☐	☐
8. Is your method free from operational and dust hazards?	☐	☐
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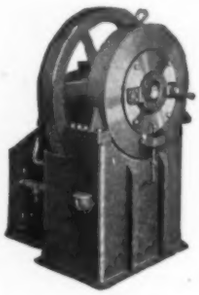

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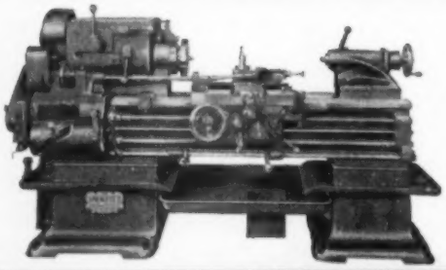

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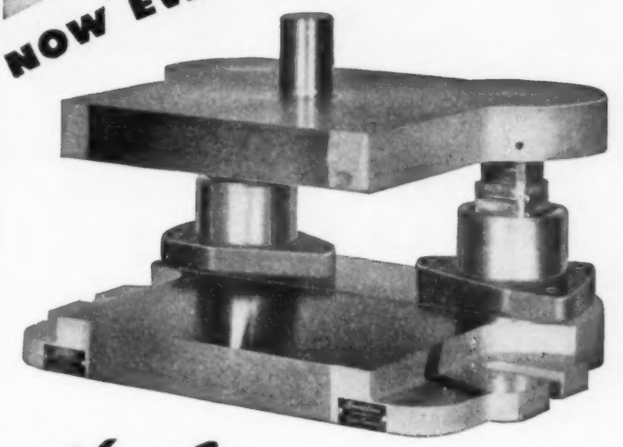

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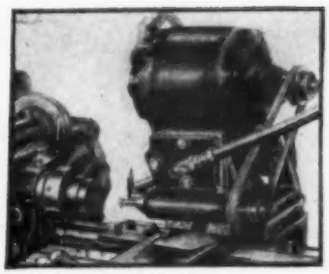

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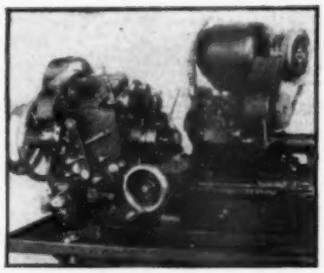

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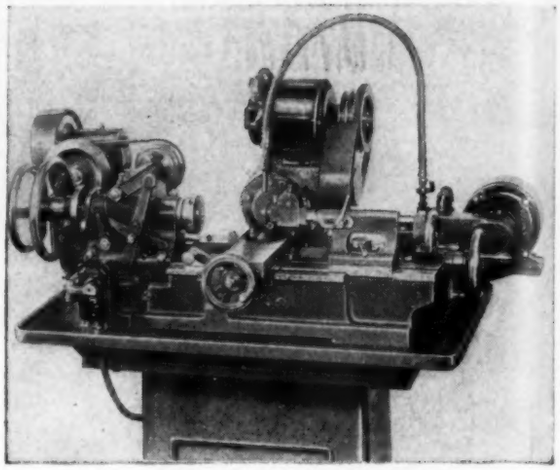

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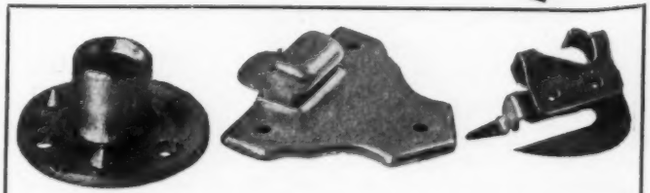

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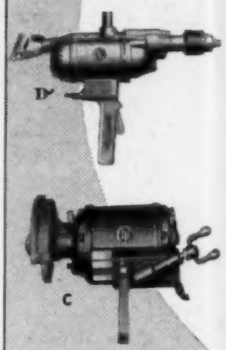
A BALL-BEARING PEDESTAL GRINDER—Designed and built for continuous production work and all general purpose grinding. Sizes: ¼ to 15 H.P.

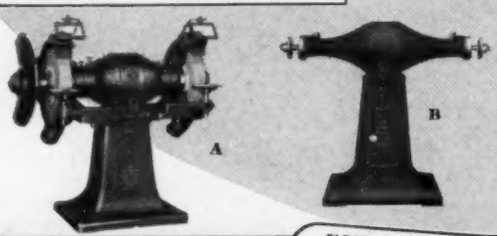
B BUFFING AND POLISHING LATHE—Especially designed, ruggedly built, for continuous service under most severe conditions. Sizes: ½ to 15 H.P.

C TOOL POST GRINDER—With or without feed, especially adapted for grinding lathe centers, cutters, reamers, rolls, dies, etc. Can be used in shaper or planer for surface grinding. Sizes: ¼ to 1 H.P.

D STANDARD DUTY BALL-BEARING ELECTRIC DRILL—For general maintenance work in industrial plants, small shops of all kinds. Sizes: ¼ to 1¼ inches.

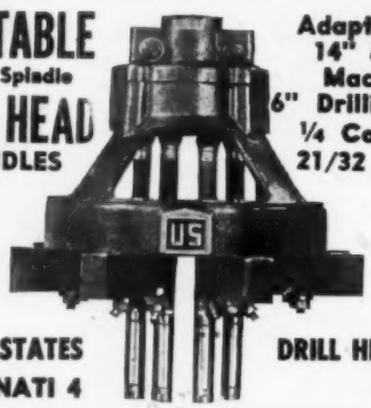
Write today for complete details.





The Cincinnati
ELECTRIC DRILLS · GRINDERS
BUFFERS · PORTABLE TOOLS
AIR MASTER DUST COLLECTORS
THE CINCINNATI ELECTRICAL TOOL CO.
Division of THE R. K. LeBLOND MACHINE TOOL CO.
2615 Madison Road, Cincinnati 8, Ohio

ADJUSTABLE
Multiple Spindle
DRILL HEAD
8 SPINDLES



Adaptable to 14" & 17" Machines
6" Drilling Area
¼ Capacity
21/32 Centers

UNITED STATES DRILL HEAD CO.
CINCINNATI 4 OHIO

STRAIGHT SIDE SINGLE CRANK PRESSES
for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economically on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

Full details on request.

straight side press

ZEH & HAHNEMANN CO.
180 Vanderpool Street
NEWARK N. J.

"Anti-friction Bearings Throughout"

CARLTON RADIAL DRILL

FEATURES—1. Low Hung Drive to the Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all speeds. 4. Concentrated and Convenient controls. 5. Constructed on Unit Principal.

The **CARLTON**
MACHINE TOOL COMPANY
CINCINNATI, OHIO, U. S. A.

ARMY E NAVY

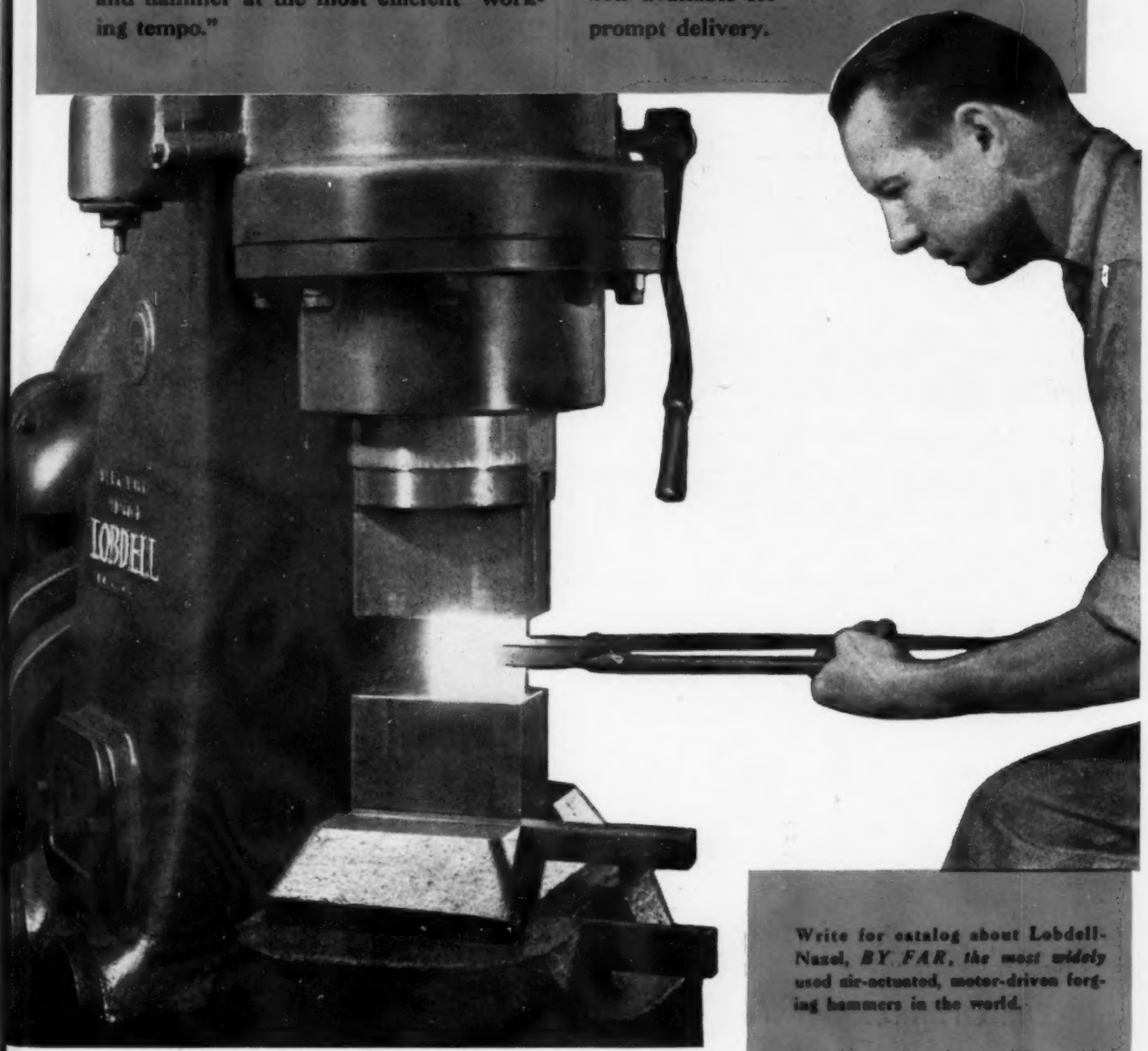
VERSATILITY

Lobdell-Nazel Forging Hammers are *ready at the push of a switch* to forge steel, wrought iron, brass or other metals.

***Operator can vary the force of the blow,* easily and quickly, whether light, medium or heavy while maintaining the rhythmic cadence *"timed" by the constant stroke frequency*—which coordinates the operator and hammer at the most efficient "working tempo."**

Increased production of close tolerance forgings, reduced reheats, more uniform forgings and lower machining costs are the results.

***Anvil and base cast in one piece* (an *exclusive* feature of Types 1B, 2B and 3B only) assures accurate alignment of dies, eliminates a costly, special, deep, concrete foundation and simplifies installation and relocation. Types 2B and 3B are *now* available for prompt delivery.**



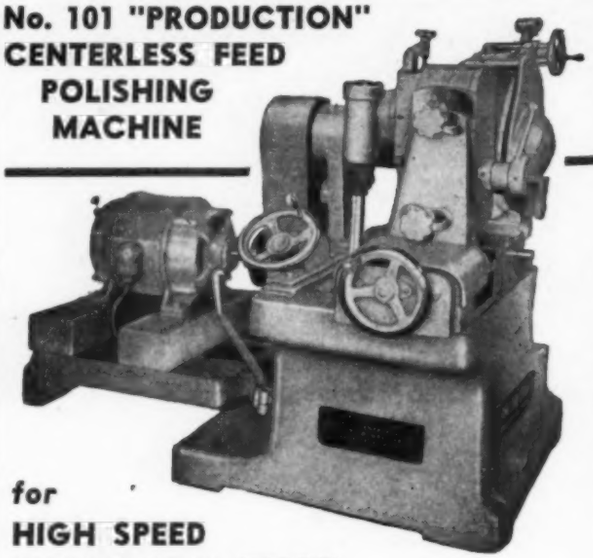
Write for catalog about Lobdell-Nazel, *BY FAR, the most widely* used air-actuated, motor-driven forging hammers in the world.

LOBDELL NAZEL FORGING HAMMERS

PAPER MILL MACHINERY • DILL "T-H" SLOTTERS • ROLLS FOR ALL INDUSTRIES

LOBDELL COMPANY ESTABLISHED 1836 WILMINGTON 99, DEL.

No. 101 "PRODUCTION" CENTERLESS FEED POLISHING MACHINE



for

HIGH SPEED CYLINDRICAL WORK

Work may be fed through this machine even with inexperienced labor and a superior finish obtained at fastest feed speeds. Any grade of finish on cylindrical work is assured at lowest cost. A patented Centerless Feed of the Roll Type is available for handling taper cylindrical work. The No. 101 machine is made also with two or more units in tandem for multiple finishing.

Illustrated literature available on request

Production MACHINE COMPANY GREENFIELD, MASSACHUSETTS, U.S.A.

Investigate

THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER *on Your Work*

• Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1⅞" to 12". It will keyseat in blind holes, and offset holes. We also manufacture oil-grooving millers.

Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

WRITE today for Catalog No. 16

NATIONAL MACHINE TOOL CO.

CINCINNATI, OHIO

Almond Drill Chuck

Write for further information.

. . for over 70 years

ALMOND THREE-JAW DRILL CHUCKS—the first to be placed on the market more than seventy years ago—pioneered the ALMOND CHUCKS have field of drill chucks. During all these many years, continued to be a necessary part in the logical procedure of machine developments.

Made in types and sizes to fit all machine tools and portable drills.

The Original Manufacturers of Drill Chucks

T. R. ALMOND MFG. CO.

Ashburnham, Mass., U.S.A.

Famous for

- ACCURACY OF THREADS
- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advt. on page 359, Jan. 16, '47 American Machinist

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
Los Angeles: *A. C. Behringer, 324 N. San Pedro St., San Francisco: Guy Reynolds, 484 Vernon St., Oakland.* Canada: *F. Barber Machinery Co., Toronto, Canada.*

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FEEDS
AUTOMATIC EQUIPMENT
THE V&O Press Co.
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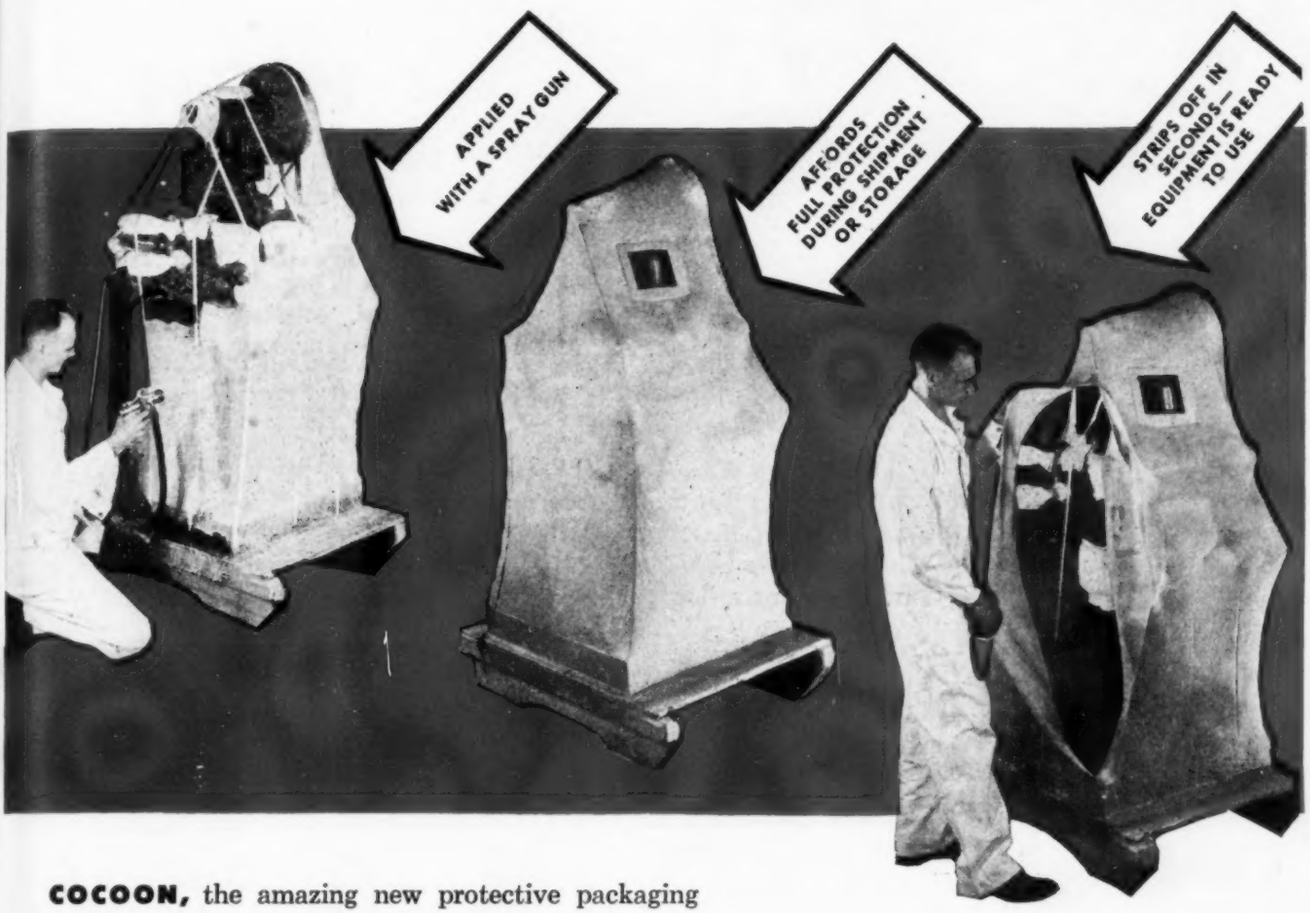
QUALITY GEARS CUT TO ORDER

• MEISEL produces but one *kind* of gears . . . gears constructed for specific jobs. Only through the inherent accuracy of this special designing could such dependability, performance and economy be possible. Tell us what you expect it to do, and we'll show you the *one* gear suited for your job.

MEISEL PRESS MFG. CO.
946 Dorchester Avenue Boston, Mass.

COCOON *Protective Packaging*


APPLIED WITH A SPRAY GUN
AFFORDS FULL PROTECTION DURING SHIPMENT OR STORAGE
STRIPS OFF IN SECONDS— EQUIPMENT IS READY TO USE

COCOON, the amazing new protective packaging applied with a spray gun, affords perfect protection against snow, rain, moisture, sun—keeps safe *anywhere* anything from a ball bearing to a locomotive. COCOON eliminates the use of greasy protective coatings; makes possible shipment or storage of equipment in ready-to-use condition.

No matter what *your* protective packaging problem—whether it involves lathes, farm equipment, motors, household appliances, tiny metal parts, or huge machines—it will pay you to check the amazing features of COCOON against your needs and submit your problem to us for analysis. *R. M. Hollingshead Corporation, Coatings Division, Camden, N. J.; Toronto, Can.*

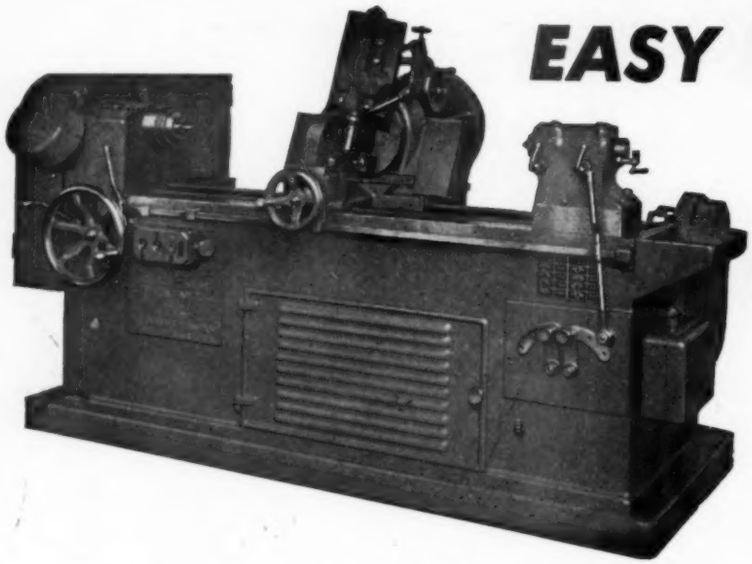
Package with Cocoon

Spray gun and air supply only equipment needed . . . bridges gaps up to 20 inches . . . no rust preventive treatments needed . . . permits packaging of equipment ready-to-use . . . resists attack by major mildew and mold groups . . . tensile strength 2000 p.s.i.; elongation 200% . . . won't soften at plus 180°F.; remains flexible at minus 40°F. . . . has extremely low moisture-vapor transmission rate . . . makes packaging easy regardless of size and shape complications . . . eliminates need for any pre-designed forms or fabrications . . . easily stripped from equipment in long, continuous sheets.

A PRODUCT OF

Whiz *Hollingshead*

LEADER IN MAINTENANCE CHEMICALS



EASY TO CONTROL • HIGH PRODUCTIVE ABILITY •

The Adams Gear Hobber and Thread Miller, made in two sizes, is known for smooth and rapid operation, great durability, and enduring accuracy and alignment.

For complete description, write for literature.

The ADAMS Company
DUBUQUE, IOWA
ESTABLISHED 1883

LINLEY'S

8 SPINDLE SPEEDS MEET ALL REQUIREMENTS . . . ECONOMICALLY

Busy tool rooms find real economy in this compact Miller and Jig Borer with its 8 speeds to 4250 r.p.m. Setup is fast and changeover easy on small dies, jigs, fixtures, patterns and models. Don't put larger machines with higher rated capacities on fussy little jobs the Linley can do in less time at greatly reduced cost.

Velvet-smooth operation is assured with grease-sealed bearings and built-in balance to all rotating parts. Direct micrometer setting and anti-backlash in quill travel add to the overall efficiency of this versatile unit.

Fits in any 2½ sq. ft. of space and (7" x 17½") table size is ample.

Ask for detailed Bulletin.

LINLEY BROTHERS COMPANY
664 STATE ST. EXTENSION
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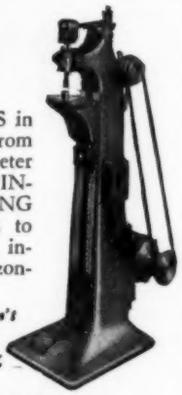
GRANT



RIVETERS — PIONEERS in their line—head rivets from smallest to ⅝" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

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85 Silliman Ave., Bridgeport, Conn., U. S. A.

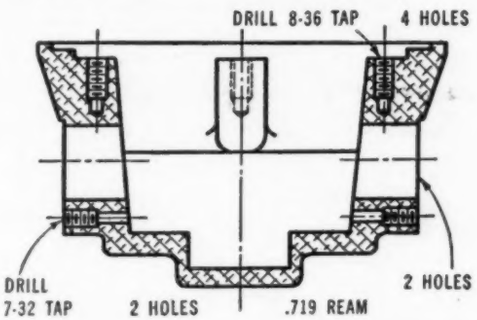
GEAR CUTTING MACHINES

New Design
New Features
New Advantages

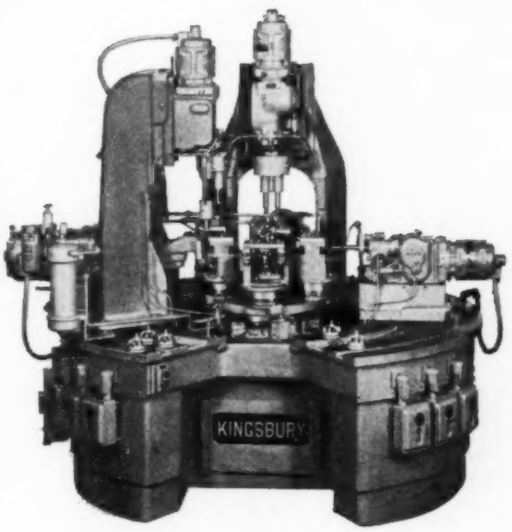
NEWARK GEAR CUTTING MACHINE CO.
69 Prospect Street, NEWARK 5, NEW JERSEY
FRANK E. EBERHARDT, *President*

Multiple Drilling for High Production

Problem Drill, tap and ream this die cast motor end bell. Accurate location is important.

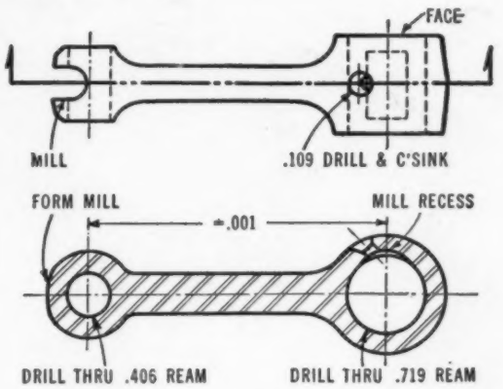


Method SPECIAL ROTATING FIXTURES make possible operations on both sides of the piece. In a single chucking, operations are performed progressively on one side at the three working stations, then the operator rotates the fixture 180° and the opposite holes are machined.

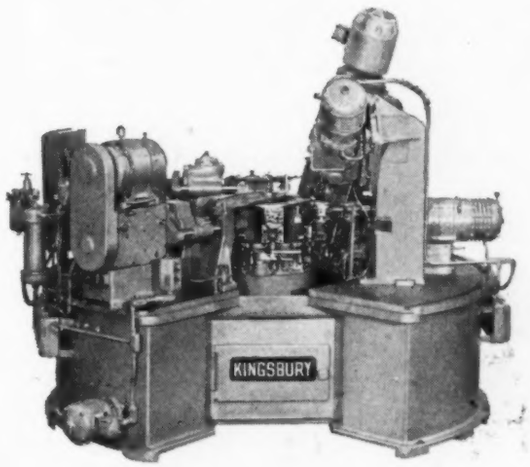


Results 220 PIECES PER HOUR GROSS and substantial savings costs. If your high production work requires multiple drilling up to an inch or so in diameter, let us propose a machine that will be completely designed and tooled ready to do your job. Send us a print and outline the operations and hourly production desired.

Problem Machine this forged steel connecting rod as shown.



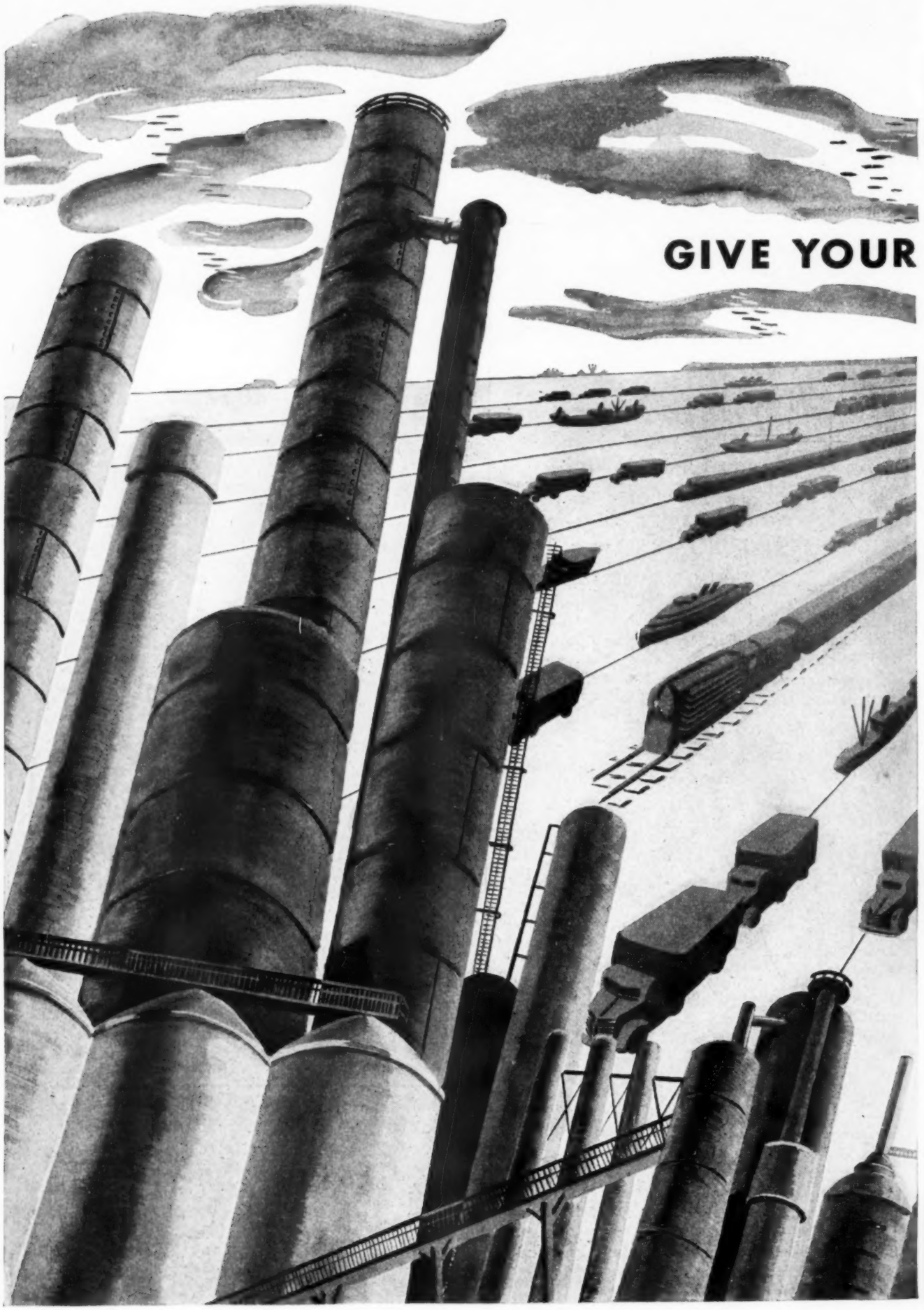
Method THE HARD-TO-REACH RECESS is milled by means of a unique device that automatically tilts the head-unit upward to make a plunge cut at the proper time. The holes are accurately located because the work is not disturbed in the fixture between operations. The machine is a nine spindle "auto-index" with eight identical work fixtures.



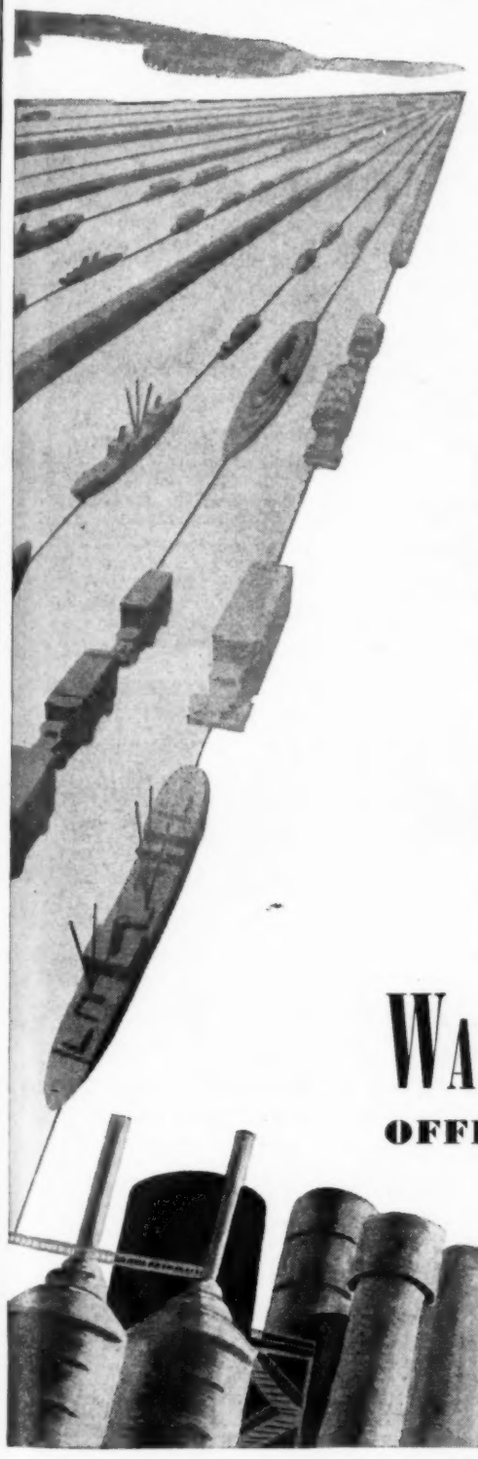
Results 150 PIECES PER HOUR GROSS. The unit cost is lower now because of more output per man hour, fewer rejections, less handling and less floor space. The initial cost is lower than most special purpose machines because the indexing, drilling and milling units and the base are all standard.

KINGSBURY MACHINE TOOL CORP., KEENE, N. H., U. S. A.

Kingsbury


GIVE YOUR

PRODUCTION A fast start



It's only in fable that the tortoise wins! And you, as an experienced businessman, know the advantage of a *fast start* in today's race for tomorrow's markets.

If you are thinking of *expanding* your production, *modernizing* your facilities, *adding* a new process, *relocating* your business or starting a *new* enterprise—look to the War Assets Administration *first* for help in getting that vital headstart.

The War Assets Administration has hundreds of ready-built plants for sale or lease . . . Plants that ran magnificently to win a war, and are in prime condition for peacetime running . . . Plants large and small . . . Plants you may take over fully equipped—or without machinery . . . Plants you may buy or rent as a whole, or occupy in part under a multiple tenancy arrangement.

Right now, when restrictions and material shortages make it so hard for you to build the business home you need, one of these immediately available surplus plants will help you solve that problem.

If you can qualify as a "small business", you will find that a *high priority* is available for your purchase of a plant through the Reconstruction Finance Corporation. Our regional offices will advise you how to obtain this priority certification. Get in touch with the nearest War Assets Administration office listed below.

Write, phone or call for the PLANT-FINDER, a fully indexed, descriptive catalog of Government-owned plants.

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OFFICE OF REAL PROPERTY DISPOSAL

Offices located at: ATLANTA • BIRMINGHAM • BOSTON • CHARLOTTE • CHICAGO • CINCINNATI
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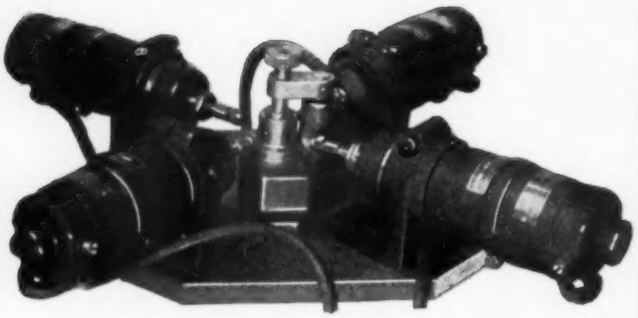
SURPLUS PLANTS

181-5



A Simple Set-up for Multiple Drilling

With the set-up illustrated, 4 holes can be drilled at once with Govro-Nelson Self-Contained Automatic Drilling Units. The number of holes drilled simultaneously can, of course, be increased or diminished according to the requirements of any particular drilling job. Likewise, the location of the holes can be changed by re-locating the Units, making the set-up adaptable to different production runs.

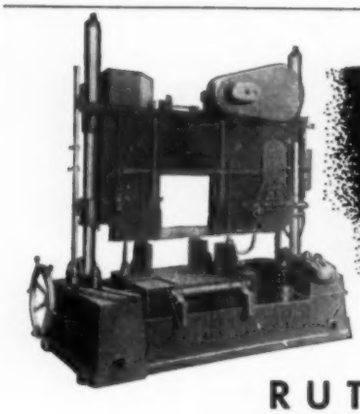
Here's a drilling method that may well prove to be the answer to your problem of reducing production costs. It is being adopted so widely that our list of users reads like a directory of America's production industries.

Send for literature giving list of prominent users, together with typical applications covering a variety of drilling jobs.

WRITE FOR Literature

GOVRO-NELSON CO.
1933 Antoinette
DETROIT 8, MICH.

Automatic **DRILLING UNIT**



IN STEP WITH THE TIMES

RUTHMAN GUSHER COOLANT PUMPS

Model 11020A

Photo courtesy Armstrong Blum Mfg. Co. Chicago, Illinois

Modern advances in the manufacture of metal cutting equipment, demand coolant pumps that are "in step with the times."

Illustrated above is an *Armstrong Blum #24 Marvel Saw* equipped as standard equipment with a *Model UL Ruthman Gusher Coolant Pump*. With *Ruthman Gusher Coolant Pumps* you are sure of efficient, economical operation and long trouble-free life. There's a model and size which will best fit your particular Coolant needs.

Write for Catalog 10A

THE RUTHMAN MACHINERY CO.

1809 Reading Road
Cincinnati, Ohio

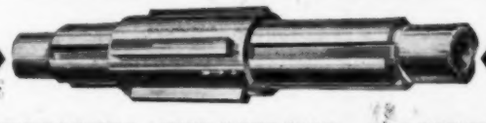
ABRASIVE

ACCURACY BOOSTS PRODUCTION

No. 1G	INTERNAL GRINDER	**No. 34**	VERTICAL SPINDLE SURFACE GRINDER
No. 1½	HAND FEED SURFACE GRINDER	**No. 3B**	AUTOMATIC FEED SURFACE GRINDER

Look for Our Full Page Advertisements

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE 14, RHODE ISLAND



NICHOLSON EXPANDING MANDRELS

Save Time 2 Ways

1) By saving the time lost in making or looking for solid arbors.
2) By promoting precision.

Set of 19 does the work of 209 solid arbors. Hardened tool steel. Two types; all sizes. Sold singly or in sets. Bulletin 1043.

Other Products: Steam Traps, Control Valves, Arbor Presses, etc.

W. H. NICHOLSON & CO., 114 Oregon St., Wilkes-Barre, Pa.

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WORCESTER 1, MASSACHUSETTS, U. S. A.

HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE

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THE SHORE INSTRUMENT & MANUFACTURING CO., INC.

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JAMAICA, NEW YORK

TELEPHONE: JAMAICA 6-4090

SPECIFY *Van Keuren* WIRE TYPE PLUG GAGES

Tool Steel
High Speed Steel
Chromium Plated
Carboloy

SET NO. 80

Wire Type Plug Gage Set No. 60 This set of gages provides accurate standards for checking twist drills in sizes from 1 to 60 (.228" to .040" diameter.) A useful set of standard size gages. Price $375.00

Van Keuren Wire Type Plug Gage Set No. 80 which includes drill sizes from No. 1 to 80 (.228" to .0135.) Price..... $425.00

The 160-page Van Keuren Catalog No. 33 gives full information on wire type plug gages and other precision measuring equipment. It also includes simplified formulas for measuring threads, splines, gears and worms. Your copy of this valuable handbook will be sent on request.

Wire Type Plug Gages were originated by the Van Keuren Co. in 1925. They are now in almost universal use for gaging small holes.

Long lasting precision and lower gauge cost are assured because the entire 2" length of the gaging unit can be used. When the end becomes worn, it is ground off and a new section of the original accuracy is moved out for use. The wire unit is securely held in the handle by a split bushing and a headless set screw.

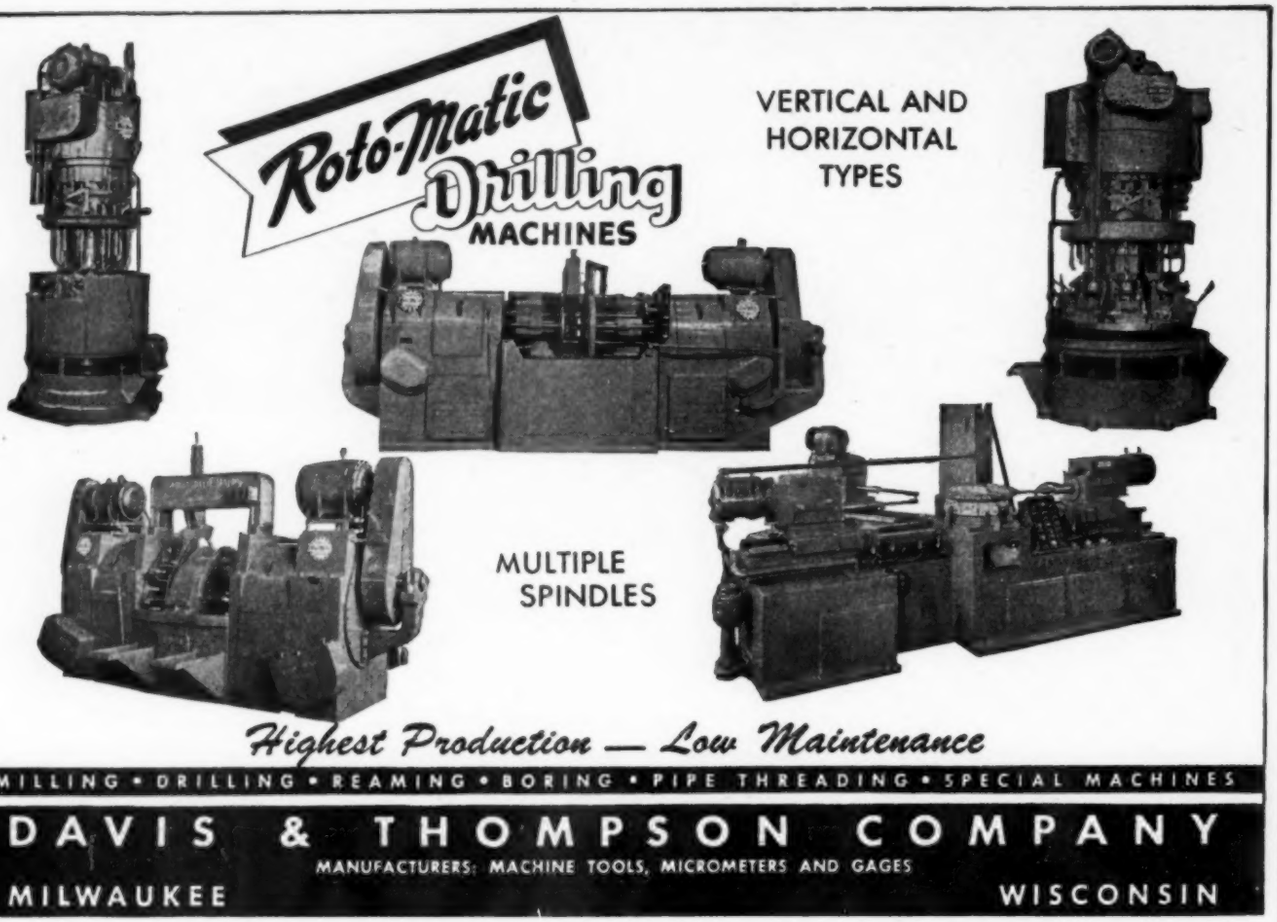
Van Keuren Wire Type Gages are made to Class B accuracy +.00005" −.00000" on the Go units and ±.000025" on the No Go units. Closer or wider tolerances can be supplied if desired.

On your next order specify VK Wire Type Plug Gages. VK Carboloy for long runs because of the enormous saving in gage cost. VK Carboloy for fussy jobs because of the infinitesimal gage wear and insurance that the parts will be within the specified limits. VK Tool Steel—High Speed—Precision Chromium for less exacting jobs. You will be assured of the best in accuracy, quality and delivery.

Van Keuren **CO.,** 176 WALTHAM STREET, WATERTOWN, MASS.

27th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires.



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MILLING • DRILLING • REAMING • BORING • PIPE THREADING • SPECIAL MACHINES

DAVIS & THOMPSON COMPANY

MANUFACTURERS: MACHINE TOOLS, MICROMETERS AND GAGES

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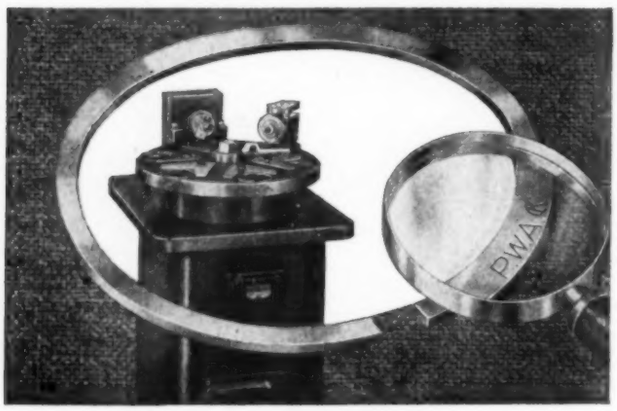

Precision Marking

Since the beginning of this century Noblewest engineers and craftsmen have devoted their efforts to Precision Marking at highest speeds and lower costs. As a result today's Noblewest machines are universally the standard for Rapid Precision Marking as exemplified by Model 183, shown above, designed especially for marking aircraft engine piston rings where distortion of thickness must be held to within .001 of an inch. Why not let us solve your marking problems? Whatever they are, we have the answers. Write Noble & Westbrook Manufacturing Co., 17 Westbrook St., East Hartford 8, Conn.

MARK IT BEST WITH

NOBLEWEST

Hi-Speed Marking Machines

For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

Giant KEYSEATERS

MITTS & MERRILL
913 Tilden St.
Saginaw, Michigan

HOLMAN BETTER, FASTER HOLE FINISHING

HELICAL TAPER PIN REAMERS

Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

HOLMAN REAMER CO.
MANCHESTER, CONN.

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Consistent Quality

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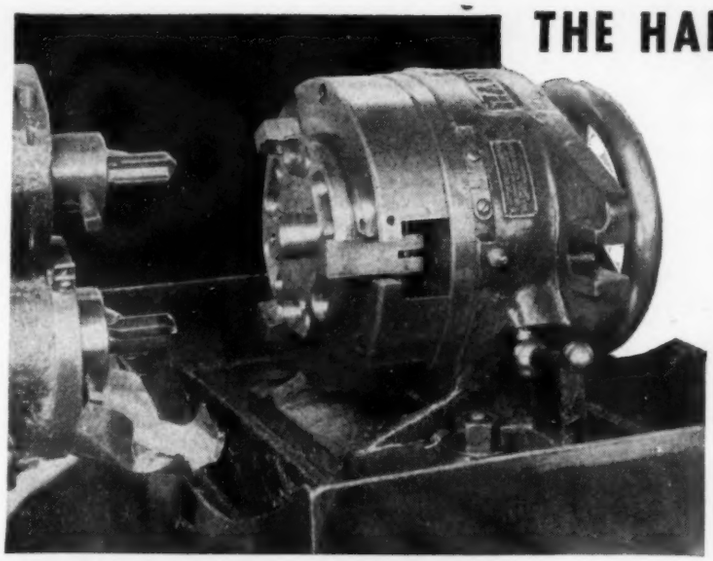

THE HARTFORD SUPER-SPACER

provides accurate indexing on a finish milling job

The operation shown here involves finish milling of an aircraft engine part. The job is handled by mounting a handwheel-controlled quick-clamping fixture on the base of the Super-Spacer. Rapid, convenient and foolproof indexing is accomplished without difficulty. Any chance of error is eliminated by the use of mask plates which are an inherent feature in the Hartford Super-Spacer.

The Hartford Super-Spacer lends itself to an almost unlimited variety of applications in the tool room and in mass production. Saving in set-up time, the ability to speed up cuts and the ease with which indexing is accomplished result in savings which assure a quick return on the investment.

Several attachments are available for use with the Hartford Super-Spacer and greatly extend its usefulness. Frequently these attachments will save the need for investing in costly jigs and fixtures. When thinking of indexing operations, therefore, think of the possibilities of the Super-Spacer.

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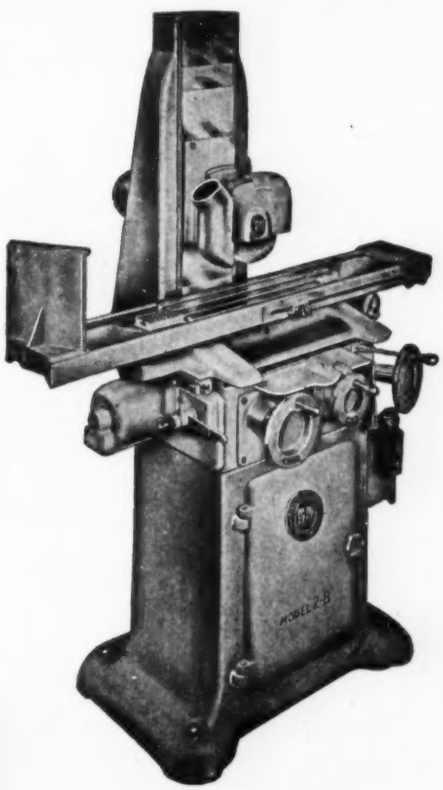
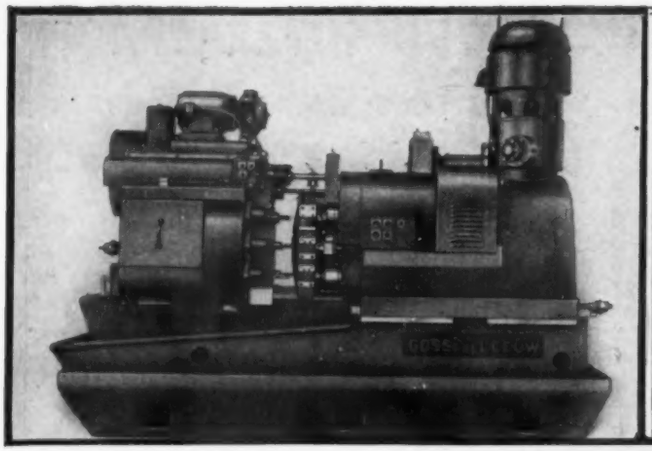
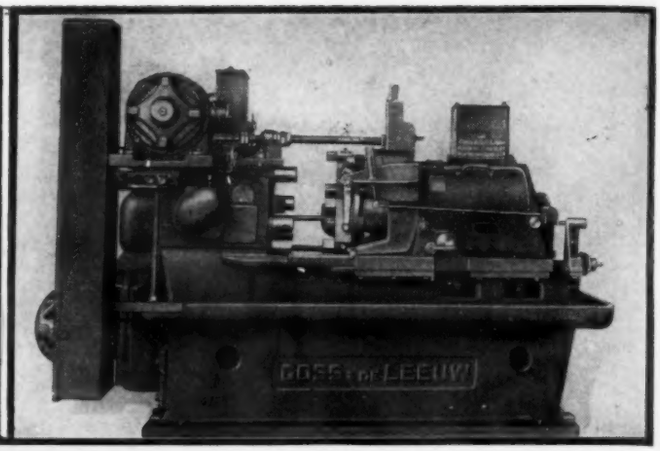


Model 2-B ALL-ELECTRIC





WORK ROTATING TYPE

5 Spindles
6 Spindles
8 Spindles

GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES

TOOL ROTATING TYPE

4 Spindles
5 Chucking Positions

On these machines, two threading operations can be handled simultaneously, each thread controlled by its own lead screw.

Among the many other modern features offered in both types are: pre-loaded anti-friction spindle bearings, hardened ways, oversize spindles and gears of chrome-nickel steel, heat-treated.

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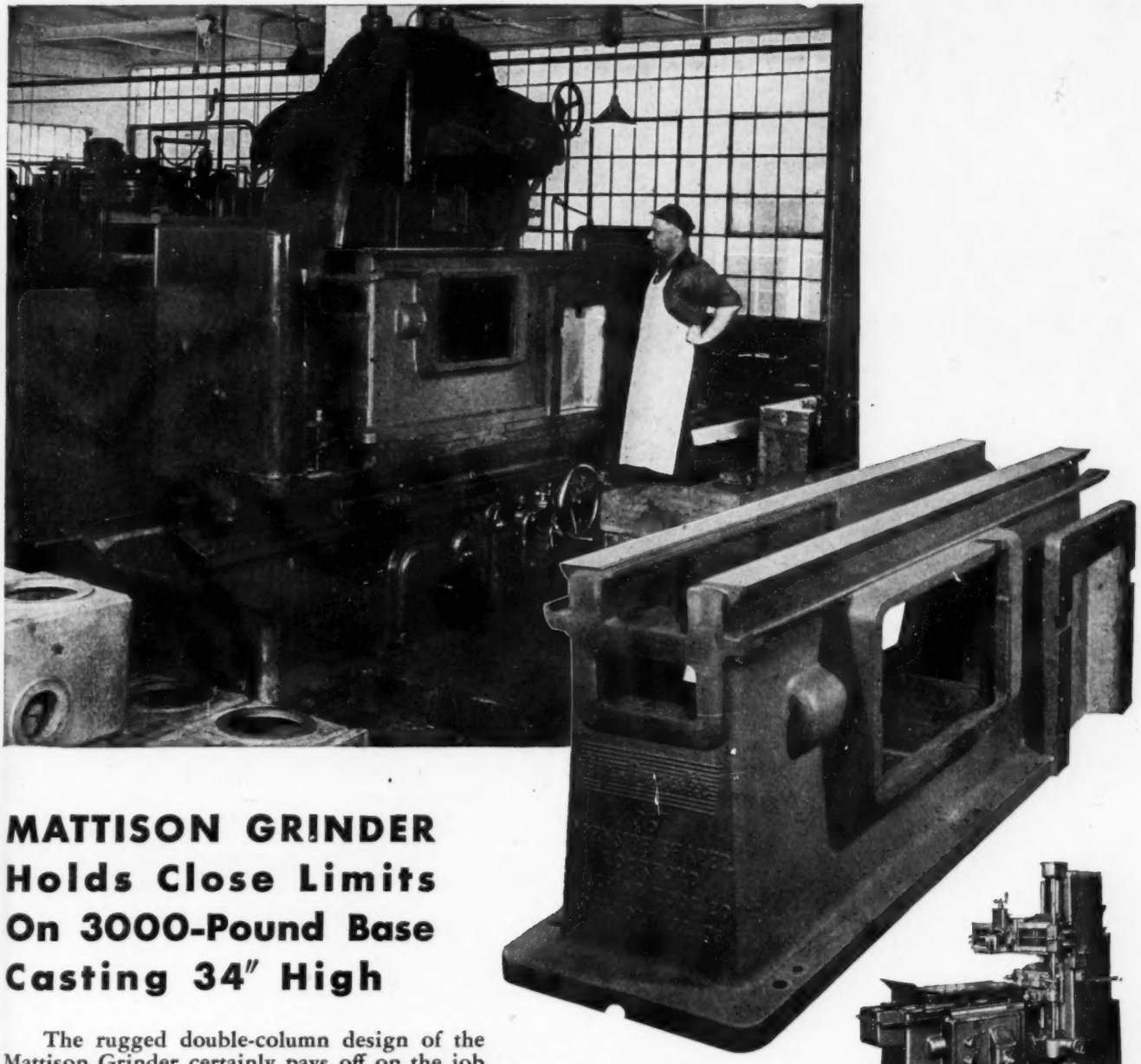


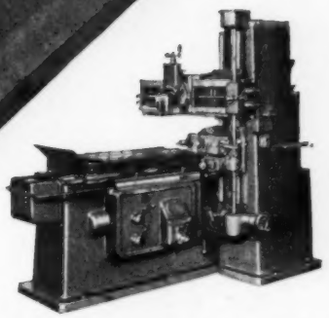
MATTISON GRINDER Holds Close Limits On 3000-Pound Base Casting 34″ High

The rugged double-column design of the Mattison Grinder certainly pays off on the job shown above. This 3000-pound iron casting, 34″ high, has two 4″ wide flat ways 74″ long. In grinding these ways the Mattison wheel-head is at the very top of its adjustment yet the surfaces ground are perfectly straight and flat within very close limits. Finish is excellent, so is grinding time of 50 minutes, floor to floor.

Other parts for Rockford Hy-Draulic Shapers, Planers, Slotters and Shaper-Planers that come to this Mattison Grinder include Tables, Saddles, Side Rails, Cross Rails, Slotter Ram Guides and Gibs in many sizes. These use the full capacity of the grinder in all directions with uniformly high production and precision on every operation.

Rugged, high powered and versatile, Mattison Grinders are capable of handling your grinding jobs on a real production basis, providing close accuracy and a fine finish.

For further information on various types of jobs ground on the Mattison Grinder, send for a copy of the latest, free, set-up book.



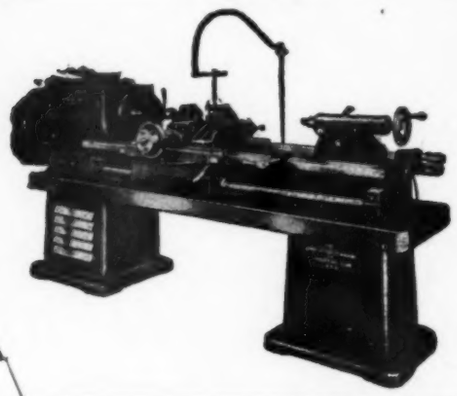
The Mattison grinder job illustrated is a base casting for the 36″ Openside Rockford Hy-Draulic Shaper shown above.

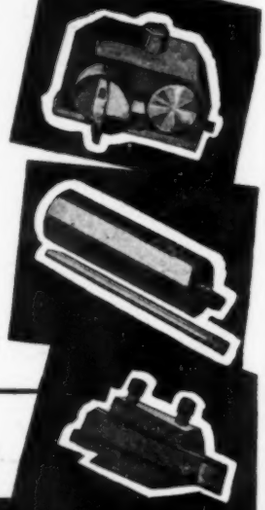
ADDITIONAL INFORMATION

Also available is free Set-Up Book showing further examples of work ground on Mattison Grinders — Send for a copy today.

MATTISON MACHINE WORKS
ROCKFORD · ILLINOIS

40 YEARS OF EXPERIENCE produced THE NEW COULTER AUTOMATIC THREADING LATHE





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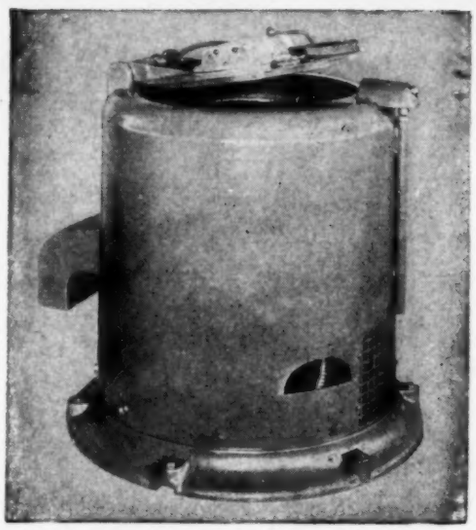

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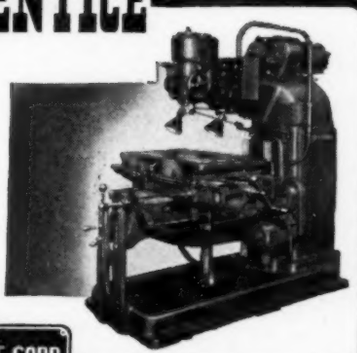

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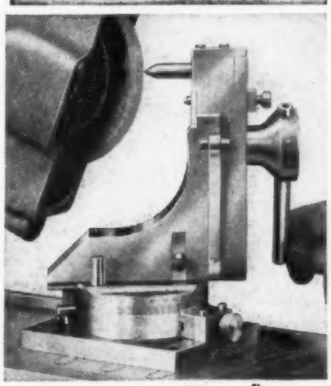

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- *7" & 14" wheel capacities*
- *Highest quality diamonds*

These are basic reasons for the choice of "Fluidmotion" Radii and Angle Dressers at Lionel and other well known plants throughout the country. There's a standard "Fluidmotion" Radii & Angle Dresser for most requirements. Send for descriptive bulletins.

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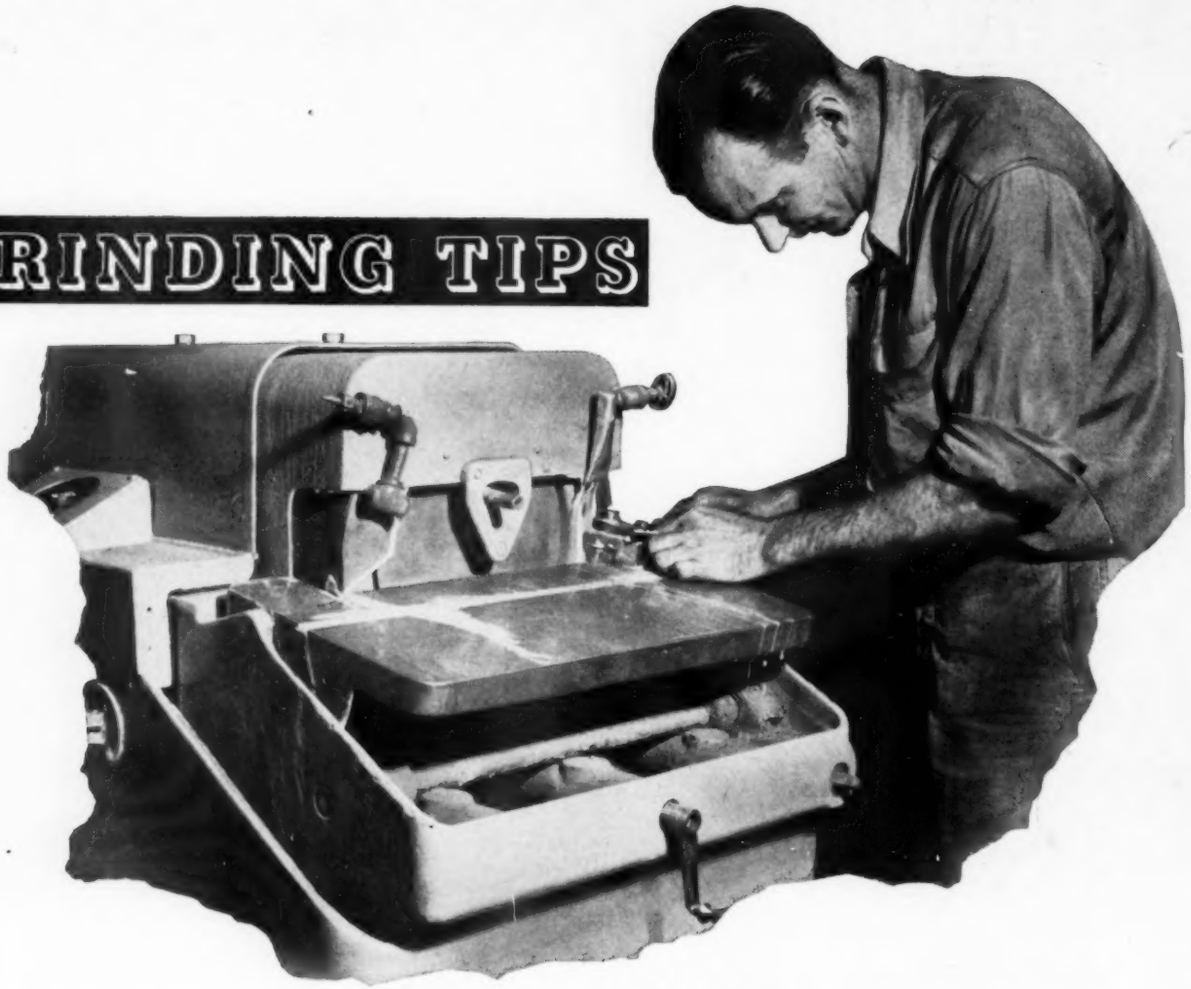

. . . HOW TO GRIND CARBIDE-TIPPED TOOLS

ARE CHIPPED AND CRACKED carbide-tipped tools a common complaint in your shop? Are your grinding wheels wearing out too soon? Here are two "tips" on grinding which Robertson engineers have found very helpful in conserving both tools and wheels.

The grinding of carbide tools by applying heavy pressure against the wheel is extremely harmful. Actually, grinding is accomplished much faster, and with much more satisfactory results, by passing the tool slowly across the face of the grinding wheel with a light, uniform pressure. This results in fewer wheel dressings, making for longer wheel life, and eliminates chipping and cracking of tips.

Grinding both the shank and the carbide tip at the same time glazes the grinding wheel and generates excess heat, causing the wheel to lose its free-cutting action. This will also chip or crack the tip and tend to loosen it in its setting. These faults are overcome by undercutting the shank about 2° more than the carbide tip.

Robertson Cool-Cut wheels for grinding carbide-tipped tools range from 6″ x 1″ up to and including 14″ x 4″ x 11″, all plate-mounted.

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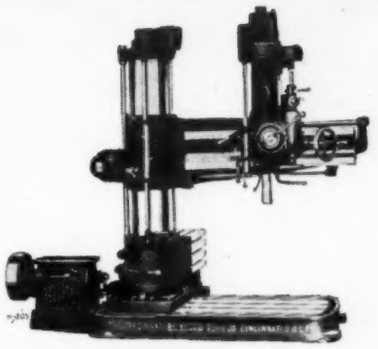
Hecker, vertical type, 8-station, air operated, 18" throat

PLANERS

20"x20"x24" N.B.P., Planer Shaper
26"x26"x8' Gray Planer, 2 heads



RADIAL DRILLS

4' Arm, 11" Column Cincinnati-Bickford
5' Arm, 13" Column Cincinnati-Bickford
5' Arm, 14" Column Fosdick, motor drive
6' Arm, 15" Column Cincinnati-Bickford
3½', 10" Col., Cincinnati-Bickford AC Motor Drive, Gear Box
1—Leland-Gifford 6-spdle. Drill Press (late model) ind. spdle. motors
Cincinnati-Bickford 5' Arm, 13" round column with air clamp. Oil grooved, tee slotted base, side base, with plain box table with #5 Morse Taper spindle. Motor drive.

FOUNDRY MOULDING MACHINES

2—#0 Johnston & Jennings, Jolt Squeezer Draw Pattern, serials #58382197, #2196
3—#342 Osborn Jolt Rollover Pattern Draw Moulding Machines
2—Spo Hand Rollover Power Draw Moulding Machines complete with run-out cars

SHEARS & METAL WORKING

Lennox Splitting Shear ¾" cap.; 8' throat
Lennox Bevel Shear, ¼" cap.
Peckstow 30"x18 ga. Squaring Shear
Gould & Eberhardt Slitting Shear, 10 ga.
Niagara 48" Roller Leveller, 6 Rolls

MILLING MACHINES

#3, #4, #5 Cinn. High Power, Plain, S.P.D.
#1-#1½ Brown & Sharpe Plain Miller
P & W 2½" Duplex Spline Miller
Thread Miller, Hall Planetary #1—24"
#8 Lees Bradner Thread Miller
#1, #2 Kempsmith Plain Millers
#3B Hendey Universal Miller, motor drive
#4 Cinn. Vertical High Power Miller. (2)

MISCELLANEOUS

15 KVA Ace Spot Welder, 18" throat, 1/60/440 volt

GRINDERS

Queen City Dble. End Grinders, motor driven (new)
#33 Abrasive Vertical Surface
#3 Abrasive Horizontal Surface
12" No. 22 Heald Rotary Surface Grinder
16" Persons-Arter Rotary Surface Grinder
1—Gardner Dble. Opposed Grinder #14
1—Seybold 96" Knife Grinder
Oliver of Adrian Drill Grinders
Cincinnati Centerless Grinders #2 M.D.
#12 Greenfield Internal Hydromatic Grinder, sizematic type, complete with Tank and Pump. 15" swing, 5" hole; 4" deep
#2 Brown & Sharpe Surface Grinder
#70 Heald Internal Grinder
#60 Heald Cylinder Grinder
10"x18" Norton Cylindrical
2—Cincinnati, #1½ Tool & Cutter Grinders

BORING MILLS

3½" Bar Landis-Rochester Horizontal Boring Mill, Model #36
#31 Lucas Horizontal Boring Mill, 3" bar

DRILLING MACHINES

Avey, 2 & 3 spindle Prentice, 4 spindle
Henry & Wright, 6 spindle, #2 M. T.
Fosdick 13" Super speed 4-spindle drills
Natco #12, 12 spindle #1 M. T.
2—Natco #14, 22 spindle Rectangular head Drilling Machine, #2 M. T.

POWER PRESS HEADQUARTERS

Famco Arbor & Foot Presses (new)
#4 Bliss D. C. Forging Press
200 ton A.C.F. Hydraulic Press. Bed. 24"x36", 4-post.
75 ton H.P.M. 2 post, Hydraulic Press
Hilles & Jones #4 Single End Punch and Shear. Equipped as Plate Shear with 18" Blades. ARR, motor drive, 54" throat

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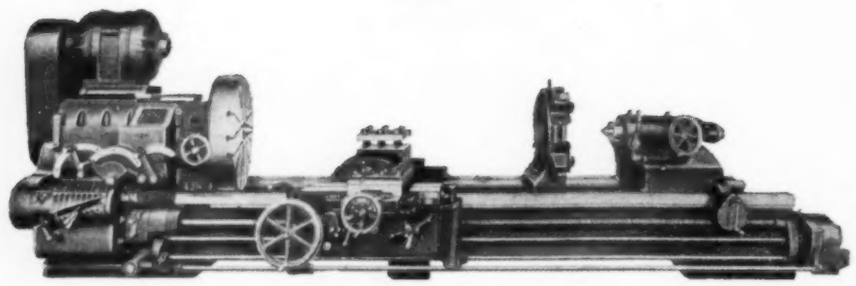

MODERN—LATE TYPE MACHINE

NEARLY

AUTO. SCREW MACHINES

BILLINGS & SPENCER B-2 Diametic—Latest
Brown & Sharpe #4, 1½ Cap., Latest type
Cleveland ⅞" to 2½" Model A
CONOMATICS 3½" 4 spindle—latest type
NATIONAL ACME 9/16" mod. C, 5 spdle., M.D.

BORING MILLS—Horizontal

DETRICK & HARVEY—3" bar—floor type—motor drive
FRANKLIN 4½" bar, single pulley drive
GIDDINGS & LEWIS #25—2⅝" bar, M.D.
LANDIS #35—3½" bar—floor type
NILES BEMENT POND 5½" bar—M.D.
NILES BEMENT POND 5", 6", 7" bar—floor type
OHIO #5F-420 5" bar, floor type, latest type
P & H #10, 3½" bar, floor type, M.D.
UNIVERSAL #3A—3" bar, Motor Drive

BORING MILLS—Vertical

BETTS 120"—2 swivel heads, motor drive
BULLARD 24", 36", 42" New Era Type, M.D.
BULLARD 42", Spiral Drive, latest type
BULLARD 86"—2 swivel heads, motor drive
COLBURN 72" 2 swivel heads, AC, M.D.
KING, 30" Vert., M.D.
KING 62" 2 swivel heads, PRT, AC, M.D.
NILES 42"—2 swivel heads; power rapid traverse
NILES 73", 100" 2 swivel heads, PRT, AC, M.D.

DRILLS

BAKER #121 Single spindle—latest type
BARNES #H3, Hydram, latest type
BARNES #210—single spindle—latest
BODINE 42-20, 42-30 automatics—M.D.
COLBURN #14, 2 spindle, heavy duty, AC, M.D.
EDLUND #1B, #2B, #2MS, M.D.
FOOTE BURT SIPP #2, #3—single spindle—latest
HENRY & WRIGHT 2 spindle
PRATT & WHITNEY No. ½Bx50" 2 spindle, Deep Hole latest type

MOREY MODERN MACHINERY

DRILLS—Radial

AMERICAN 3'9" Hole-wizard, latest
AMERICAN 3½'9"—Maxi-Speed, Motor Drive
AMERICAN 4'9"—4'11"—5'11"—5'13" AC, M.D.
BICKFORD 5'13", AC, M.D.
CANEDY OTTO 3'11" New
CARLTON 6'17"—Latest Type
CARLTON 4'13", 5'14", 6'15"—M.D.
CINCINNATI BICKFORD 4'11", 4'13", 6'15", 6'19"
DRESES 4'13", 5'13", AC, M.D.
DRESES 5'15", Universal, AC, M.D.
FOSDICK 5'14", AC, M.D.
MUELLER 4½'9", AC, M.D.
NILES BEMENT POND 6'15" uni., AC, M.D.
RYERSON 4'11", AC, M.D.
WESTERN 3', 4'18", 5'18", 6'20", latest type

GEAR CUTTING EQUIPMENT

BARBER COLMAN Type A Hobber—latest
BARBER COLMAN Type S, #3, #12 Hobber, M.D.
FELLOWS #7, #7A type, all models, latest
FELLOWS #6, #6A type, all models, latest
GLEASON 6", 11", 18" bevel gear generator, M.D.
GLEASON—12" bevel gear generator—latest
GLEASON #13 tester, M.D.
GLEASON 15" Quenching Press
GLEASON 24" Bevel Gear Planer
G & E #96H Gear Hobber, with differential
GOULD & EBERHARDT 18H Hobber with in-feed, differential, M.D.
HERCULES 24" Hobber Differential, M.D.
PRATT & WHITNEY 10" Grinder, hyd.—latest type

DEPENDABLE MACHINE TOOLS • PROMPT SERVICE

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GRINDERS—Cyl.—Plain & Uni.

BROWN & SHARPE #1, #2, #3, #4 Univ., motor drive—latest type
BROWN & SHARPE #5 Plain 3x12, 3x18 LATEST
LANDIS 6x18, 6x20, plain, M.D.
LANDIS 6x30 Plain Type "C", Hyd. latest
LANDIS 10x24—Universal—Type "C"—Hyd.—Latest
NORTON 10x18 Plain—motor drive
NORTON 10x36" Plain Type C, Hyd., latest type
NORTON 16x72 Plain, Type C—latest type
NORTON 24x240" Plain, M.D. Type A

GRINDERS, Internal, Cutter and MISCELLANEOUS

BROWN & SHARPE #10 Tool & Cutter—latest
BRYANT No. 16—16" Chucking—Internal—latest
BRYANT #5 Internal, hyd., latest type
CINCINNATI #2, #3, #4 centerless, LATEST TYPE
FITCHBURG Uni., spline shaft, hyd.
GLEASON #12 cutter grinder
HEALD 72A3 Plain internal, latest type
HEALD 72A3 Sizematic internal, latest type
HEALD 72A5 plain internal, latest type
LeBLOND #2 uni., tool and cutter, latest type
OLIVER Tool and Cutter, Latest Type
PRATT & WHITNEY Contour Cutter—latest type
SELLERS #1 Tool—Motor Drive
SELLERS #2 Tool—Motor Drive
SELLERS #4T Uni., Tool—latest type

GRINDERS—Surface

ABRASIVE #3 22x8x12, M.D.
ARTER 8" Rotary Surface
ARTER 30" Rotary Surface—Hydraulic—latest type
ARTER Automatic Piston Ring
BLANCHARD #16A—Dial Type—motor drive
BLANCHARD #16, 20" Chuck, Motor Drive
BLANCHARD #18-30" chuck—latest
BLANCHARD #27—42" Chuck—Latest
BROWN & SHARPE #2 M.D., Latest Type
GALLMEYER & LIVINGSTON #35—8"x24"—Hyd.
MATTISON 12x16x48 Hyd., Latest Type
MATTISON 14x16x36 Hyd., Latest Type
MATTISON 14x16x60 Hyd., Latest Type
NORTON 10x36 Hyd., Latest Type

LATHES—Engine & Mfg.

AMERICAN 36x25' centers—Timken Bearing—2 carriages P.R.T. Taper Attachment—Latest Type
AMERICAN 42x25' bed geared, M.D.
BRIDGEFORD 36"x28', 36"x32' bed—2 carriages, M.D.
HARDINGE TR59, Motor Drive., Latest Type
HARDINGE 9x54" bed, QCG, Cataract
HENDEY 14"x8' bed geared head
HENDEY 20"x8' bed motor drive
HENDEY 22"x8' bed, geared head
HENDEY—12x54 centers—Mfg.—latest type
HOUSTON, STANWOOD & GAMBLE 42x25' bed
LeBLOND 13"x4' bed, Timken Mfg.—latest
LeBLOND 14"x54" Centers, Timken, Latest
LODGE & SHIPLEY 14x30 centers, Timken, latest
LODGE & SHIPLEY 16"x30" Centers. Timken, latest
DOSWING 5x34" Model LR Auto. Timken latest Bearing—latest type
LOSWING 5x34" Model L Auto. Timken latest
MONARCH 22x48" Centers, Timken, latest
NILES 48x10' centers—heavy duty—Timken Bearing P.R.T.—Latest Type
NILES 60x10' centers—heavy duty—Timken Bearing P.R.T.—Latest Type
NILES 60x15' centers—heavy duty—Timken Bearing P.R.T.—Latest Type
PITTSBURGH 50'x30' bed—M.D.
PRATT & WHITNEY 16"x30" Centers, Timken, Latest
RIVETT #698—8"x18" Centers

LATHES—Turret

GISHOLT #4 Univ., Timken Bearing—latest
GISHOLT #3D Simplimatics—Timken—latest
GISHOLT #1L, #2L, #3L, Universal, Timken Bearing, Latest Type
GISHOLT #4L, 9" hole—cross sliding turret—Timken Bearing—latest type
JONES & LAMSON #3, #7C Univ., latest type—Timken Bearing
LIBBY #1H-5 Timken Bearing—latest 5½" hole
BARDONS & OLIVER #3, #5, #7 Timken Bearing—latest type
CINCINNATI ACME #1, #5W, Timken bearing, latest type
MOREY 2G, #3, #4, Timken Bearing, latest
WARNER & SWASEY #3, #4, Uni., Timken bearing, latest type
WARNER & SWASEY 1A, Uni., Timken bearing—latest type
WARNER & SWASEY #2, Timken, latest
WARNER & SWASEY #4A—uni. 8" hole, timken bearing, Latest Type

MILLING MACHINES—Mfg.

BRIGGS Type 2A, production, HYD, latest type
BROWN & SHARPE #000—Timken Bearing, Latest Type
BROWN & SHARPE #12 auto., Timken—latest
CINCINNATI 4-36 Hydro. Timken Bearing—latest
CINCINNATI #0-8 Vert.—Pl. Auto.—Timken Bearing—latest type—Rise & Fall
CINCINNATI #1-12, #1-18 Plain Auto.—Timken Bearing—latest type
CINCINNATI 48" duplex, automatic, SPD
KEARNEY & TRECKER #1218 Auto.—Timken Bearing—latest type
MOREY #12M 2 spdle, Profiler & Milling Machine
NICHOLS Hand, M.D.—Latest Type
OHIO Auto. 16"x72" table—Timken Bearing

MILLING MACHINES—Plain

BROWN & SHARPE #2 Light Type, Timken Bearing, Latest Type
CINCINNATI #2L—Timken Bearing, Latest Type
CINCINNATI #3 High Speed, Dial Type, Timken Bearing, latest type
CINCINNATI #4 Timken Bearing, M.D.
CINCINNATI #4S, #5, high power, M.D.
KEAR EY & TRECKER #3K—Timken—latest
KEMPSMITH #4 Maximiller—Timken—latest

MILLING MACHINES—Univ.

AMES Bench, Timken Bearing, latest type, M.D.
CINCINNATI #2, dial type, Timken—latest
HARDINGE Bench, Timken Bearing, Latest Type
ROCKFORD #2B—Motorized
VAN NORMAN 22L, Timken Bearing, Latest Type
VAN NORMAN #36 Timken Bearing, Latest Type

MILLING MACHINES—Vertical

BROWN & SHARPE #5—motor drive
CINCINNATI #2, #4—Dial Type—Timken—latest
GORTON #9J High Speed, Latest Type
KEARNEY & TRECKER 2H, 2K, 3H, 3K, 4H, 4K, Timken—latest

PLANERS

CINCINNATI 24" Crank—Motor drive
CINCINNATI 48x48x20', 3 heads, AC M.D.
CHANDLER 36x36x20' 4 heads, AC, M.D.
DETRICK & HARVEY 48x48x16', 4 heads, Hyd.
DETRICK & HARVEY 48x48x12 Openside, AC, M.D.
GRAY—45x48x16'—4 heads—AC, M.D.
HAMILTON 42x42x20', 4 heads, motor drive
LYND FARQUHAR 20" Openside, motor drive
NBP 48x48x14', 16, 2-4 heads, AC, M.D.
NBP 54x54x12', 2 heads, box table, AC, M.D.
NILES 48x48x12'—Time Saver—3 heads, P.R.T., box table, DC, M.D.—latest type
NILES BEMENT POND 96x80x20' box table, 4 heads, Hyd., PRT—motor drive
OHIO 42x42x20'—2 heads, AC
PATCH 48x48x14', 4 heads, DC, M.D.
POND 48x48x16' 2 heads, AC, M.D.

SAWS

BRIDGEPORT #48W Abrasive
CAMPBELL #213, 401, wet abrasive, latest
ESPEN LUCAS #138—Cold Saw, M.D.
GROB #OS-200 band, latest type
MOTCH MERRYWEATHER #3 Cold Saw—Hyd.—latest type
PEERLESS 14x14 Hack; latest type

SHAPERS

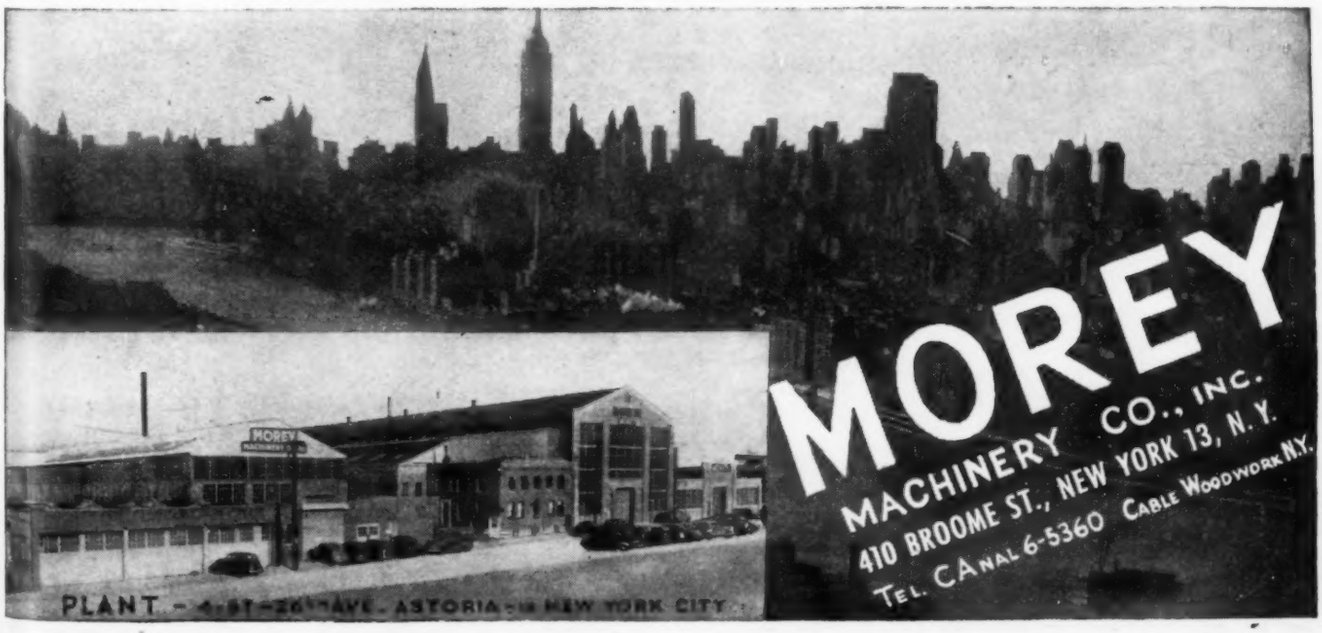
CINCINNATI 28" Travel Head—2 head Type B
COCHRANE BLY Univ. Vert. Shaper-Miller, M.D.
GOULD & EBERHARDT 24" Uni. Industrial—Latest
LAMAIRE 18' Vert. Hydraulic—latest type
MOREY 10", 14" Vertical—latest type
NEWTON 15" vert. slotter, D, M.D.
MILES 18" ver. slotter, DC, M.D.
PRATT & WHITNEY 8', 10" Vertical, Motor Drive
ROCKFORD 24" Hyd.—latest

THREAD MILLING MACHINES

HALL—Planetary, M.D.—Latest Type
MOREY SHIELDS 12x120, 12x192—latest type
PRATT & WHITNEY 4½x12, Model "C"—Latest
PRATT & WHITNEY 6x132—Motor Drive
PRAT & WHITNEY 6x20 Model "C"—Latest
SMALLEY General #20 MB, Motor Drive

MISCELLANEOUS

BARNES #420 2-spindle deep hole Drill—Hyd.—Latest Type
BAUSH Radial Tapper—latest
BILLINGS & SPENCER, 200, 400, 800 lbs. board drop hammer, latest type
FERRACUTE No. DG55, Drawing, latest type
GENERAL ELECTRIC 100KW Generator
LANDIS ¾" Bolt Threader—latest
LaPOINTE #3L Broach, horiz. hyd. 15 ton cap.
LeBLOND #2 horiz. Hone 8S, latest type
LeBLOND #2 deep hole borer, latest type
MORTON 6S" Combination traveling head planer, milling and drilling motor drive
NILES 30"x50' deep hole borer, Timken—latest
PRATT & WHITNEY 3-B Jig Borer—Latest type
SHUSTER #1 Wire Straightener
TREADWELL 12"—Pipe Threader—Motor Drive
WHITON 8x108 centers duplex centering, M.D.
YATES AMERICAN J-70, Woodworking Lathe, latest
YODER Multiple tube cutting machine—latest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NOW IN STOCK

No. 2 Cincinnati Centerless Grinder, with Filmatic bearing, hydraulic profile truing attachment, through feed work rest, motor driven. New in 1942.

12′ x 3/16″ Bertsch Combination Punch and Shear, with 15″ gap, double geared, motor driven.

AUTOMATICS

5⅛″ Cleveland Model A, single spindle.
16″ x 33″ Fay Automatic Lathe.
⅞″ Cleveland Model M, four spindle.

BORING MILL

No. 31 Lucas, motor driven.

DRILLS

★ **4 Ft. American Hole Wizard Radial Drill, motor on arm, new in 1940.**
No. D2 Colburn, single spindle.
No. 314 Baker, single spindle.
★ **21″ and 28″ Cincinnati-Bickford Super Service Drill.**
42″ Cincinnati Bickford.
Allen Sensitive Drill, four spindle.
★ **No. 3 Bausch Multiple, 20 Spindle, No. 2 Morse Taper, Rectang. Head 20″ x 40″.**

GEAR CUTTERS

Model A and D Barber-Colman Gear Hobbers.
No. 3 and No. 12 Barber-Coleman Gear Hobbers.
No. 61 Fellows Gear Shaper, m.d.
6″ Gleason Str. Bevel Gear Generator.

GRINDERS

36″ x 168″ Mattison Surface Grinder.
No. 22 Heald Rotary Surface Grinder.
No. 16-26″ Blanchard Surface Grinder.
No. 72A3 Heald Sizematic Int. Grinder.
No. 72A3 Heald Gagematic Int. Grinder.
No. 13 Brown & Sharpe Universal & Tool.
10″ x 24″ Norton Cylindrical Grinder.
★ **14″ x 36″ Landis Type C Hydraulic Universal Grinder, motor driven.**
No. 2 & No. 3 Cinci. Centerless Grinder.
No. 35 Excello Thd. Grndr., new in 1943.
No. 5VRO Hammond Buffer.

LATHES, ENGINE

14″ x 6′ Sebastian, motor in base.
16″x6′ Hendey, g.h.
20″ x 12′ Lodge & Shipley, g.h.
48″ x 12′ Lodge & Shipley, C.D.
IMP and LR Lo-Swing, m.d., new in 1940.
15″ x 30″ Lipe Carbo-matic, new in 1943.

LATHES, TURRET

No. 3A Warner & Swasey, g.h.
No. 2A Warner & Swasey, Timken Bearing, new 1942.
No. 1A Warner & Swasey, g.h., new 1943.
No. 1B Foster, g.h.
No. 4 Warner & Swasey, g.h., new in 1942.
No. 5 Warner & Swasey, Universal, g.h., New in 1943.
No. 3 Warner & Swasey, g.h., new in 1943.
No. 1 Bardons & Oliver, c.d.
No. 1 Brown & Sharpe, m.d.
No. 6D Potter & Johnston.

MILLS

No. 31 Lucas Horizontal Bor'g Mill, m.d.
No. 36 VanNorman, Ram Type, m.d.
No. 4A Brown & Sharpe Universal, s.p.d.
No. 3 Cincinnati Universal, s.p.d.
No. 4 Cin. Plain, Rect. Overarm.
No. 2H Milwaukee Plain double overarm, motor in base.
No. 2-MH Cincinnati Plain, m.d.
★ **No. 4H Milwaukee, Double Overarm, motor in base, new 1940.**
No. 2H Milwaukee Vert., motor in base.
No. 2209 Milwaukee, Table 22″ x 158″.
No. 3-36 Cinci. Hydromatic Duplex, m.d.
No. 6 Whitney Hand Mill.

MISCELLANEOUS

No. 17 Greenerd Arbor Press.
No. 100 Micromatic Hydrohoner.
8″ x 7″ Troy Vertical Steam Engine.

PLANERS AND SHAPERS

16″ Gould & Eberht. Crank Shaper, m.d.
★ **6″ Pratt & Whitney Vertical Shaper.**
36″ x 36″ x 12′ Liberty Planer, 2 heads, box table.
42″ x 42″ x 20′ Cin. Planer, D.C. Rev. m.d.

TAPPERS

No. 2BG Garvin.
Leland-Gifford Radial.

(Approved Dealer for War Assets Administration Surplus Machines)

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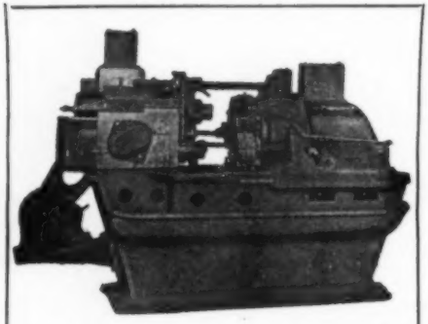

8½" x 8" GOSS & DELEEUW CHUCKING MACHINE

Capacity 8½" in diameter x 8" long 5 chucks on turret

Maximum opening between chuck jaws 9⅝"

Minimum opening between chuck jaws 7⅝"

Maximum distance spindle nose to face of turret 23¾"

Dies and taps controlled by positive lead screw

Arranged for Motor Drive, without motor

Weight approximately 12,000 lbs.

(Available for Prompt Delivery)

Emerman Machinery Corporation

875 W. 120th St., Chicago 43, Ill.

CONSIDER THESE VALUES

For Better Performance

10″ x 36″ Norton Plain Hyd. Grinder, 1941.

Japanning Oven, Newcomb-David 13′ x 7′ x 5½′, gas fired. Complete with 1 beam. Fan and Reeves Drive.

2⅝" 8-Spindle Conomatic, 1941.

#11 Polymatic Form & Cut-off 5/16" capacity. Excellent condition.

Ames Precision Univ. Bench Mill, new.

#1B Kearney & Trecker Univ. Mill, Dividing Head, Vise, Motorized.

#4 Gisholt Univ. Turret Lathe, Hyd. Speed Selector, 1941.

These and other useful items REASONABLY PRICED and ready for IMMEDIATE DELIVERY AT

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NEW—USED MACHINERY and EQUIPMENT

Hasco MACHINERY COMPANY

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LARGE STOCK ON HAND

UNUSUAL VALUES

Blueprint machines, printer-washer-dryer
Rivett Ball Brg. Precision Screw-Machine
Simmons No. 1A Micro Milling Machine
Drills, high speed single & multiple spindle
Drills, 21″ Royersford Bk. Grd. Pr. Feed, New
Drills, sensitive, 2 and 4 Spindle
Drill, #25 Foot-Burt ,motor driven
Drills—New—18″ Royal Motor driven (10)
Gear cutter, Brown & Sharpe #3—26
Gear Cutter, Gould & Eberhardt 42″
Grinder, Webster and Perks #1-¾ motor drive
22″ Buffalo Pr. Fd. Motor Drive, New
16″x8′ Hendey Lathe, Quick Change Gear
Magic Chucks #1-2 & 3 and Collets
Pipe Machine, 3″ Oster motor drive
Planer 24″x24″x8′ Pease, motor drive
Punch & Shear, two ½″ & ⅝″ capacity
Shaper, 24″ Gould & Eberhardt
Turret Lathe, 2″ Acme & Warner & Swasey
Welders—Arc & Spot in Stock—New

Outfit: about 27 fine machine tools, drills, lathe, and 5 milling machines, pulain and Uni. Tel us definitey what you want as our list is incomplete and only partial.

The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

THE OSBORNE & SEXTON MACHINERY CO.
COLUMBUS, OHIO

BORING MILL or VERTICAL TURRET

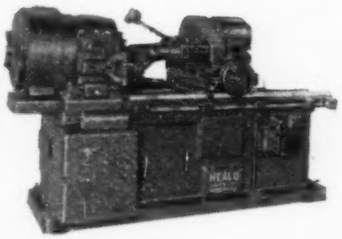
36″ Bullard "New Era", with side head, form cutting and threading attachment. Serial No. 11177.

With or without motor. In very good condition. Immediate shipment.

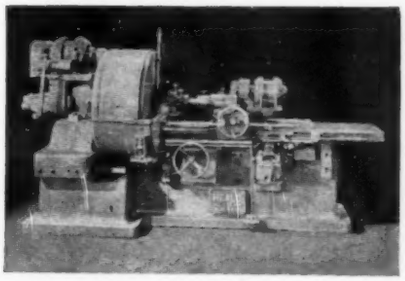
GALBREATH MACHINERY CO.
Empire Building Pittsburgh, Pa.

Eastern

Latest Type
NEW MACHINES
at Substantial Savings

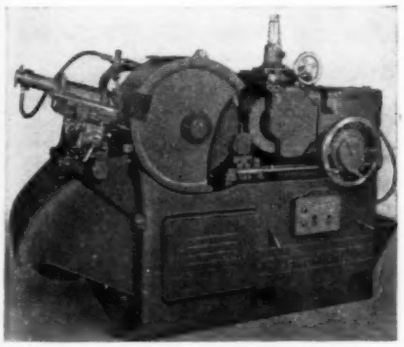


Eight (8) No. 73 Heald Airplane Cylinder Grinders, arranged for motor drive and complete with four A.C. motors and control. Also have Heald Red Head Spindle, maximum speed of 5000 rpm.



One (1) No. 172 Heald Gap Plain Internal Grinder, A.C. motor drive and complete with motors and controls. Also have Heald Red Head Spindle.

One (1) No. 2 Cincinnati Centerless Grinder, motor drive with A.C. motors and standard equipment. Also complete with profile hydraulic diamond truing attachment, wheel truing diamond, heavy duty low thrufeed work rest, work support, wheels, etc.



Two (2) No. 3 Cincinnati Centerless Grinders, motor drive with A.C. motors. Machines are equipped with regulating wheel, grinding wheel, pump, piping, hydraulic wheel dressing attachment, etc.

One (1) 21", 1L Cincinnati Bickford Upright Drill Press, motor drive with box column.

Six (6) No. 1B Edlund High Speed Ball Bearing Drill Presses, motor drive and equipped with A.C. motor, and Jacobs Chuck.

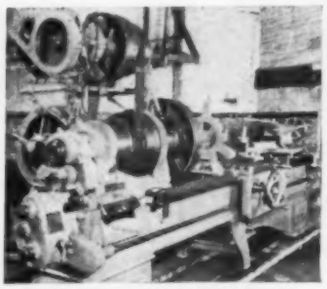
One (1) 16" Arter Rotary Surface Grinder, complete with A.C. motors and magnetic chuck.

Three (3) No. 50 Heald Hydraulic Cylinder Grinders, motor drive with A.C. motors. Equipped with long cross slide table, jig for holding the cylinder block, 15" spindle.

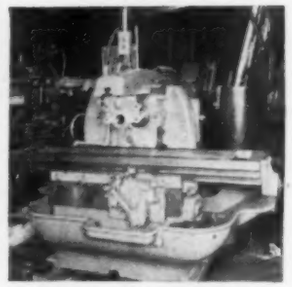
Two (2) No. 0-8 Cincinnati Model EA Plain Automatic Milling Machines, motor drive with A.C. motor. Also complete with rise and fall spindle carrier.

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS EMCO

AT REDUCED PRICES

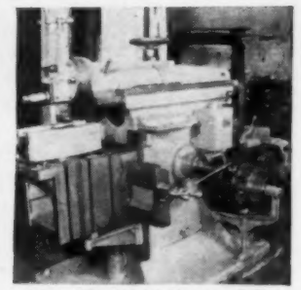


American Q. C. Lathe, 24"x96" C.C., motor & Drive. $1500.00.



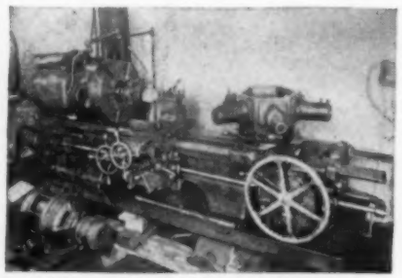
DeVlieg model 31 Super Mill, motor, $800.00.

Brown & Sharpe #4B Plain Miller, less motor, $1200.00



Niles 20" Crank Shaper, B.G. Motor and Drive, $1200.00.

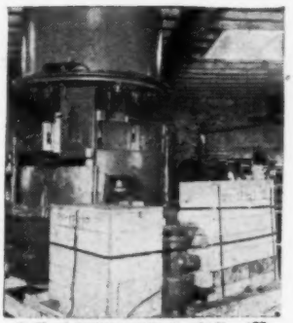
ALSO IN STOCK



Warner Swasey 3A Universal Lathe serial 320000, $1400.00.

3—Acme Gridley RA 6 spindle, 1¼" Bar Machines, new 1942, $5950 ea.
Wickes geared head Engine Lathe, 30" swing x 34' overall, $2500.
2—#3 Barber Colman Precision Gear Hobbers.
Cincinnati #4 Plain Miller rectangular overarm, $1800.
K & T Simplex Miller, new 1942, $1750.
King 42" Vertical Boring Mill, $1100.
Cincinnati #2 Vertical, all geared Miller, $1000.
Racine hydraulic Cut-Off Saw, 12"—1942, $1250.
2—W & S #3 Universal Turret Lathes with bar attachment complete, 1942, $2400 ea.
W & S #4 Universal Turret Lathe, preselector head, 1941, $2300.

Many Other Good Machines including
2 Late Sand Blast Units



Bullard Multamatic 6 spindle, 12" $3500.00

GENERAL MACHINERY AND EQUIPMENT CO.
Warehouses in Harrisburg, Lancaster and Philadelphia, Pa.

180 S. 15th STREET
HARRISBURG, PA.

EXCEPTIONAL USED MACHINERY BUYS! AT REYNOLDS

1—500lb Standard Machinery Co. Automatic Drop Hammer (new)
1—#2 Bardons & Oliver hand turret lathe, bar feed (condition new)
1—#4 Warner & Swasey Universal turret lathe
1—#7 Bardons & Oliver Universal turret lathe, 2" bar equipment
1—#2 Cincinnati Centerless grinder (new Aug. 1945)
1—#21 Reed Thread roller and equipment
1—36" Bullard Vertical Boring mill, 4-jaw table
1—#72A (3) Heald Internal grinder
2—#120A Grant Rivet Spinners, air vise and air actuated
2—#1 Avey 4-spindle drills, motor driven
1—#2H Kearney & Trecker Vertical Miller
1—#2K Kearney & Trecker Vertical Miller
1—#3H Kearney & Trecker Vertical Miller
1—#4H Kearney & Trecker Vertical Miller
1—16"x72 Landis type cylindrical grinder
1—#2 B&S light type Vertical Miller, 220/3/60

REYNOLDS MACHINERY CO.
305 Eddy St. Providence 3, R. I.
GAspee 5187

MACHINE TOOLS

84" CINCINNATI HYPRO Vertical Boring Mill

#18 Blanchard Surface Grinder, 36" Chuck

16"x72" Norton "C" Plain Grinder

#262 Barnes Upright Drill, Box column

5'-17" Cincinnati-Bickford Radial

7½" 6-spdl. Goss & DeLeeuw Chucker

#2L Van Norman Plain Miller

8"x48" J. & L. Thread Grinder

#3 and #4 Warner & Swasey Universal Turret Lathes

24"x72" American Lathe

ALL LATEST TYPE MACHINES

HAZARD BROWNELL
350 Waterman St., Providence 6, R. I.
Dexter 8880

CHI. STEEL POWER APRON BRAKE
1—Brake Size #187, bending capacity 8'x¾". Equipped with power clamp, driven by 7½ HP G.E. motor, 3 phase, 60 cycle, 220 volts, with automatic compensator.
Misc. Supply Division
PHILADELPHIA TRANSFORMER COMPANY
BOX 566, DALTON, PENNA., TEL. 165
PLANTS: DALTON AND PHILA.

National Bent Shank Nut Tappers—Battery of ⅝" and ⅞" Machines.
2 Landis ¾" Bolt Formers and Threaders, M.D.
1 National ½" to 1" Hot Bolt Head Trimmer
Woodward & Powell 42" x 42" x 36 ft. 4 Head Planer
Cincinnati 36" x 36" x 16 ft. Planer, M.D.
1 Lodge & Shipley 36" Swing by 44 ft. Bed, Selective Geared Q.C. Lathe, M.D.

National Machinery Exchange
128-138 Mott St., New York 13, N. Y.

PROMPT DELIVERY FROM OUR WAREHOUSE:

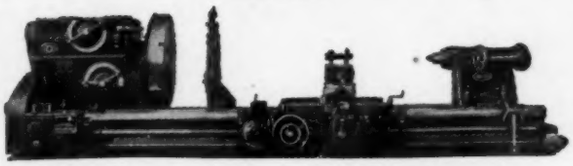
#412 New Britain Gridley 4 Sp. Automatic Chucking Machines (3)
36" Niles Vertical Boring Mill, 2 heads
Foot-Burt Horizontal Boring Mill 3" Bar
Beaman & Smith Horr. Boring Mill, 3" Bar
Model R-14, Seneca Falls Automatic Le-Swing Lathes (8)
Model LR, Seneca Falls Automatic Le-Swing Lathes (3)
K & T Milwaukee Model M-24 Simplex Manufacturing
Cincinnati Model 0-8 Vertical Manufacturing Mill, Rotary Table
Cincinnati Automatic Production Mill
Coulter Model H Hob Thread Millers (5)
Lees Bradner Model 40 Thread Millers. (2)
Le Blond Plain Miller, 72"x10" Table working surface.

CONTINENTAL SALVAGE & MACHINERY CORP.
1836 Euclid Ave. Cleveland 15, Ohio

POWER PRESSES
BLISS, TOLEDO, V & O, ETC.
REBUILT – GUARANTEED
MONA
JOSEPH **HYMAN** & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

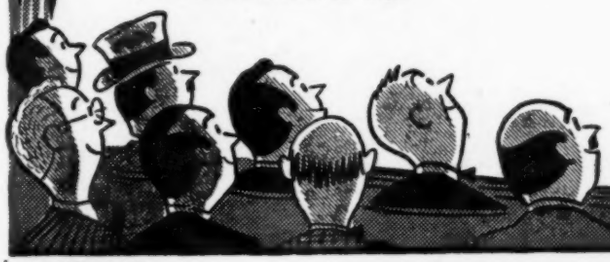
SIMMONS CURRENT ATTRACTIONS

LATHES



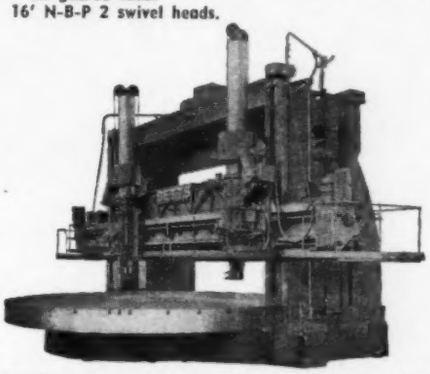
48"x45' (35' centers) NILES (General Machinery) Heavy Engine Lathes. 16-speed geared head—stock, two carriages with P.R.T., AC or DC, M.D. (New 1942).

30"x18' AMERICAN 12 Speed, G.H.
36"x32' NILES, "Timesaver".
42"x34' LEBLOND late type
30'x34' LEBLOND Gun Boring.
48"x30' SIMMONS, Geared head.
60"x30' NILES Heavy Duty Geared Head, M.D. (Built 1942).
60"x31' (20' centers) NILES, 16-speed G.H. Lathe (New 1942).
90" PUTNAM Driving Wheel Lathe with journal truing and Double Quartering
No. 2-H LIBBY, Full Universal Cross Feeding Turret, Taper Attachment, M.D.
3-AL GISHOLT, Hardened Ways.



BORING MILLS

9" Bar BETTS Horizontal floor type, 50" face plate 6'—vertical travel, modern, 4-motors.
3" & 4½" Bar Universal TRI-WAY Horizontal Boring Mill, P.R.T.
No. 35 LANDIS Horizontal floor type
24" New Era, BULLARD
72" KING, Two Swivel Heads.
100" N.B.P. Two Swivel Heads.
12' BETTS Heavy Double Drive
14-20' N.B.P. Extension type boring—2 swivel heads, all geared feeds
16' N-B-P 2 swivel heads.



14' BETTS (Consolidated) Heavy Vertical Boring and Turinig Mill, with two swivel heads, arranged motor drive with 40-H.P., 230V D.C. motor and control (New 1942).

SIMMONS MACHINE TOOL CORPORATION

MAIN OFFICE & PLANT: 1759 NO. B'WAY, ALBANY 1, N. Y. N. Y. OFFICE: 50 E. 42nd ST., N. Y. 17, N. Y.

LATE TYPE—

12"x30" LeBlond Grd. Hd., M.D., Lathe
16"x30" Monarch Grd. Hd., M.D., Lathe
18"x48" Monarch Grd. Hd., M.D., Lathe
22"x48" Monarch Grd. Hd., M.D., Lathe
22"x48" L. & S. Grd. Hd., M.D., Lathe
22"x11' Lehman Grd. Hd., M.D., Lathe
#2 Cin. HS. Dial Plain Mill
#4—48" Cin. Hydro Dup. Mill
No. 3 SU Van Norman Universal Mill
No. 1A—W. & S. Preselect Grd. Hd., Uni.
3'11" Cinci-Gilbert Radial Drill, M.D.
4'11" Carlton Radial Drill, M.D.
6 Spindle No. 3B Edlund Drill, M.D.
#3 B & C Gear Hobber
Type A Barber-Colman Gear Hobber
#3 Cinci. centerless Grinder

New Logan Lathes, all models in stock
7" Logan shapers M.D.

GEORGE M. BERNSTEIN & COMPANY

12 So. Clinton St., Chicago 6, Ill.

POWER PRESSES

BLISS 304—58 ton, 8" stroke, 18" x 18" bed
CLEVE 10S— 90 Ton, 8" stroke, 22"x22" bed
CLEVE 14E—225 Ton, 1" stroke, standard bed
BLISS 7—180 ton, single and double act. 1½-4½" stroke, 24"x36" Bed
BLISS 7—88 ton, 4-8" stroke, Horizontal Horning
BLISS Hydro-Dynamic 100, 150, 200 ton adj. stroke, 30"x31" Bed
NATIONAL MAXIPUS NO. 6, 2000 ton. 12" stroke, 46"x54" bed
BLISS 88—226 ton, 10-30" stroke
BLISS 26A—800 ton knuckle
BLISS 27—1000 ton knuckle
CLEVE 14S—180 ton, 8-30" stroke
CLEVE 8K—800 ton knuckle, 6" stroke
CLEARING K 1800—42, 800 ton knuckle 6" stroke
TOLEDO 59½S—504 ton, 8" stroke 31"x 31" bed, twin dr.

Coco Stamps—24x48, 36x48, 48x48, 60x156
Pneumatic Drop Hammer 36x48 3000# Head
Hydraulic Presses 75 ton to 5000 ton
Planer, Cinci 60"x60"x14'—4 heads
300,000# Draw Bench (NEW) with motor generator for 40 ft. tube, single, double, triple heads

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DRILL, RADIAL—FOSDICK, 3½". G.B., M.D.
KEYSEATER—MITTS & MERRILL No. 6, M.D.
MILLER, PLAIN—MILWAUKEE No. 2-B Double Over-arm, M.D.
PLANER, MEAL—WOODWARD & POWELL 30"x30"x8' 1 rail head, 1 side head
TURRET LATHES—FOSTER No. 1-B Univ. Inc. 2 Wrenchless Chucks, etc. M.D.; also W & S No. 2-A Univ.
Available Immediately—Also Many Other Tools
ALEX ZEEVE & COMPANY
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No. 2 Cincinnati Tool & Cutter Grinder with radius attachment.
4"x18" Landis Hydraulic Plain Grinder
6"x30" Norton Cam Grinder

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Belt Cutters 1"-1½"-2"-2½" Acme Landis
Boring Mills, 36"-42"-52"-72"-96"
Drills, Radial 6' Cin. Bick., 5' Carlton.
Lathe, Turret 3-A W. & S. S.P.D.
Millers, Plain No. 3 K & T, No. 4 Cin.
Planer, 36"x36"x12' Powell 4 Hds.
Profiler, #13 P. & W., B.D.
Shapers, 16"-20"-24"-36"
Shaper, 36" Morton Draw Cut

West Penn Machinery Company
1210 Henne Bldg. Pittsburgh, Pa.

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AUTOMATICS

5/8" & 2" Cleveland Model B
12"x63" & 14"x19" Fay
14"x18" Monarch Magna-Matic
6"x6¾" Goss & DeLeeuw
No. 454 New Britain chucking
Gisholt simplimatic

BORING MILLS

100" Niles Bement Pond heavy pattern
96" Cincinnati Massive Pattern
60" Colburn
53" Niles Bement Pond
42" & 24" Bullard V.T.I.

DRILLS

4' Hammond sensitive radial
18" Walker Turner radial
No. OOS Natco
Garvin duplex
21"x74" Munson double end
4-spdl. #3 Leland Gifford
24" Kokomo upright
24", No. 25 Foote Burt Heavy Duty
34-spdl. #30 Natco

LATHES, TURRET

Nos. 4 & 5 Warner & Swasey universal
Nos. 3-B & 5 Foster universal
Nos. 3 & 5 J. & L. universal
16"x6' South Bend
Nos. 3 & 5 Foster
24" & 42" Bullard vertical
28" Gisholt
3"x36" Jones & Lamson

PRESSES

12 ton U.S. OBI
#10 Bliss straight side
8 & 20 ton General Flexible
35 ton Metalwood straightening
65 ton Watson Stillman straightening
500 ton Southwark hydraulic
1000 ton Lake Erie hydraulic

SHAPERS

16" Gemco (new)
20" American
24" Gould & Eberhardt
32" Morton draw cut

UPSETTERS

1" National
2½" National, latest type with air clutch & guided ram
3" National

MISCELLANEOUS

#10-D Moline cylinder borer
#112-C Ex-Cell-O precision borer
Nos. 1, 2 & 3 Sundstrand balancers
No. 3 Gardner buffer
1400 CU. FT. Sullivan compressor
173 cu. ft. Ingersoll compressor
Nos. 2 & 3 Cincinnati centerless grinders
No. H-1 Micromatic Hydrohoner
#211 Barnes honer
No. 1½ Baker keyseater
No. 9 LeBlond multi-cut lathe
6", 8" and 15" Sundstrand automatic stub lathes
#12-B Pratt & Whitney profiler
Cleveland sand cutter
6", #401 Campbell abrasive saw
Model J Radiac abrasive saw
#11-B Badger alligator shear
4" Stevens die slotter
16" Bement Miles slotter
#2 Garvin tapper
2" #22 Murchey threader
90 KVA Fisher body seam welder

SEND FOR COMPLETE LIST

MILES MACHINERY CO.
SAGINAW, MICH.

IN STOCK

LATHES

12"x18" Lipe Carbo, M.D.
18"x6' American Grd. Hd.
18"x48" Monarch, Keller attachment (1942)
20"x10" Lodge & Shipley Grd. Hd.
22"x48" Monarch, (1943)
36"x30' Lodge & Shipley Triple Geared Selective Head, two carriages
42"x18' Putnam Geared Head
42"x30' American Grd. Hd.

MILLING MACHINES

#3 Cincinnati Vert.
#3 Milwaukee Vert. M.D.
#3K Milwaukee Vert.
2H Milwaukee Plain (1942)
No. 4 Cincinnati Plain, Motor Drive
No. 4K Milwaukee Plain Late Type
No. 118 Van Norman Production
24" Cincinnati Production
Taylor & Fenn Spline
No. 27MB Smalley General Thread
#2 Hanson-Whitney Thread
No. 6 Lees-Bradner Thread
24"x24"x12' Ingersoll Adjustable Rail
26"x25"x12' Ingersoll Adjustable Rail
42"x36"x14' Ingersoll Adjustable Rail, four heads

DRILLS

D-8 Colburn Hvy. Duty
No. 2-8 Spdl. Leland-Gifford
7' American full Universal Radial
7' Carlton, Motor on arm

VERT. BOR. MILLS

34" King
42" Bullard New Era Vertical Turret
8' Cincinnati

HOR. BOR. MACHINES

2½" Bar Universal, Motor Drive

GEAR MACHINES

No. 7 Fellows Gear Shaper
12" Michigan Gear Shaver

PLANERS

36"x36"x8' Woodward & Powell

TURRET LATHES

No. 2 American Brass Lathe, M.D.
No. 2 Brown & Sharpe, Wire Feed
#3 W & S Univ. Bar Feed (1940)
No. 1-A W & S Univ. Speed Selector (1941)
No. 5 Jones & Lamson Univ.
No. 4-A W. & S., 8" hole (1940)
#4—W & S 1½" Screw Machine
#6—W & S 2" Screw Machine
#6R Denver Univ. 2-9/16" capacity
18" Libby—3½" Hole—M.D.

GRINDERS

#22—12" Heald Rotary Surface
10"x24" Landis Universal, M.D.
No. 16 Blanchard Surface, 26" chuck
No. 34 Abrasive surface
No. 2 Cincinnati Tool & Cutter
Norton Motor Driven Grinders practically all sizes from 6x18 to 24x240.

HILL-CLARKE MACHINERY COMPANY
651 Washington Boulevard
Chicago 6, Illinois
APPROVED WAA DEALER CHI-9

WHEN WORK WON'T WAIT...

WIRE WIGGLESWORTH

OF CAMBRIDGE, MASS.

LATE MODELS OF MACHINE TOOLS FOR EARLY DELIVERY

BORING MILLS

3" UNIVERSAL HORIZONTAL, M.D. (1942)
No. 340-F G & L Floor Type 60" headstock and column travel, (1943)
36" KING Vert. Turret Lathe, (1942)

GRINDERS

No. 72-A3 HEALD Pl. Int., M.D. (1942)
4"x12" LANDIS Type H Plain Cyl., M.D., Practically New.
14"x168" NORTON Type C Cyl., M.D. (1942)
No. 4T SELLERS Tool Grinder, M.D. New —Used only few hours.
No. 11 BLANCHARD ROTARY SURFACE, M.D., 16" & 20" chucks (1942)

LATHES

22"x96" Centers MONARCH "M", M.D. (1944)
42"x132" Centers AMERICAN "SUPER PRODUCTIVE", M.D. (1942)
50"x17' Centers LeBLOND "BIG SWING", M.D. (1942)

MILLING MACHINES

No. 1H-12 K & T MFG. MILLER (1941)
No. 4MS CINCINNATI PL. MILLER (1942)
No. 5H K & T Pl. MILLER, M.D. (1942)

RADIAL DRILLS

3'-11" AMERICAN "HOLE WIZARD", M.D. (1941)
3'-11" MORRIS "MOR-SPEED", M.D. (1941)
4'-13" CINCINNATI-BICKFORD RADIAL, S.P.D. through Gear Box.

TURRET LATHES

No. O B & S WIRE FEED SCREW MACHINES, M.D. (1941), (3)
No. 4 W & S UNIV. TURRET LATHES, M.D., chucking, Pre-Selective Head, (5)
No. 5 W & S UNIV. TURRET LATHE, M.D., chucking, Pre-Selective Head.
No. 5 J & L TURRET LATHE, M.D. (1942)
No. 1A W & S UNIV. TURRET LATHES, M.D. (1941), (3)

MISCELLANEOUS

24" CINC. BICKFORD BOX COLUMN UPRIGHT, M.D. (1943)
No. 4½ BLISS SS 3-CRANK D.A. PRESS, M.D.
New HUB 15 ton OBI PRESS, M.D.
New U.S. OBI PRESS, 12 ton, M.D.

WIGGLESWORTH MACHINERY CO.
203 BENT STREET
CAMBRIDGE, MASS.

PUNCH PRESSES

IMMEDIATE DELIVERY FROM STOCK

No. 4½ BLISS, 80-100 Ton Capacity straight side punch press, late model with scrap cutters, double roll feeds, bolster. 10 H.P. motors and controls, forced feed lubrication. 21x27 bolster 4½" stroke. In both Single and Double Action Models. Like new.

No. 6 BLISS 90-125 Ton Capacity, straight side Punch Presses, late model. With scrap cutters, roll double roll feeds, bolster, 15 Hp motors and controls, forced feed lubrication. 25x30" bolster, 5½" stroke. In both Single and Double action models. Like new.

#62, 62A, 162 BLISS Presser, 35 Ton Cap., late models.

1—#87 BLISS Press, 175 Ton cap. 32" stroke, late model.

#666 Toledo, Knuckle Joint Press. 1000 ton cap. 37x21 bolster, 2½" dist. bed to slide, good condition, all electrical equipment.

SPOT WELDERS IMMEDIATE DELIVERY 5-300 KVA, Brand new. 5 year guarantee.

PAUL'S MOTOR AND MACHINERY SUPPLY CO.
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TYLER 76300

MONA MEMBER

NEW

Power Presses 52" & 72"
Spot & Arc Welders
Abrasive No. 1½ Surface Grinders, M.D.
Racine 6 x 6" Hacksaws, M.D.

AARON MACHINERY CO., INC.
45 CROSBY STREET NEW YORK, N. Y.

LATE TYPE—*GUARANTEED*—PRICED LOW — LIKE NEW — IMMEDIATE DELIVERY

12"x30" Mod. CK Monarch Lathe (1943).
4H Milwaukee Horiz. plain mill. (1943).
3K Milwaukee Horiz. mill. (1943).
No. 2 LSM 4-sp. 20" L.-G. Drill, No. 2 M.T.
No. 2 LSM 4-sp. 26" L.-G. Drill, No. 2 M.T.
No. 3 Cincinnati H.S. plain dial type miller.
No. 2K Milwaukee vertical mill. (1943).
No. 2A Reid Surface grinder (1940).
Model EE 10x20" Monarch turret lathe (1944).
No. 2 Campbell Nibbler, ⅜" cap.
Gorton Munitions Engraver.
22"x48" ctrs. Monarch Model CM lathe (1943).

(ALL AC MOTOR DRIVE)

Licensed Dealer for War Assets Administration

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NEW and USED—Hand and Power Brakes, Shears, Forming Rolls, Folders, Punches, Rotary Machines, Stakes, Spot and Arc Welders.

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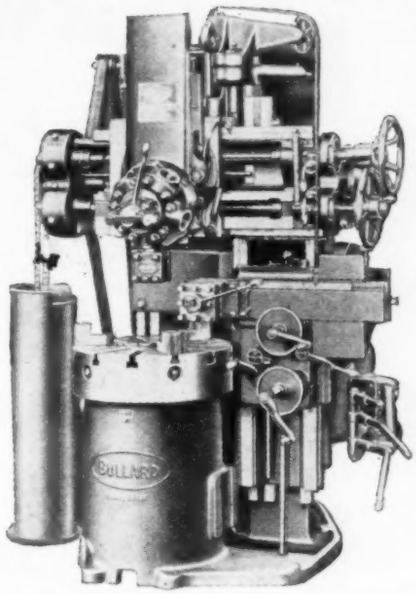

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1—Amer. 20"x12', Eng. Lathe, ast. sw. 26", 2" rising blocks, dist. betw. cens. 90", 12 speed, grd. hed.

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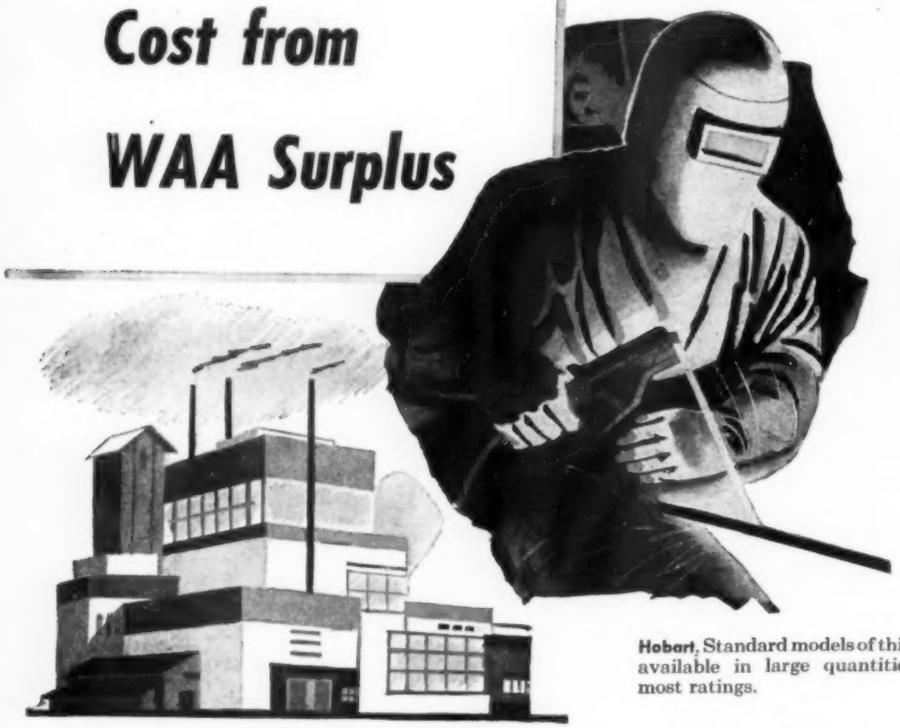

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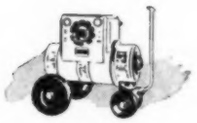

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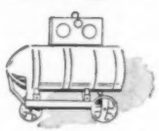

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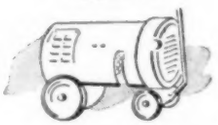

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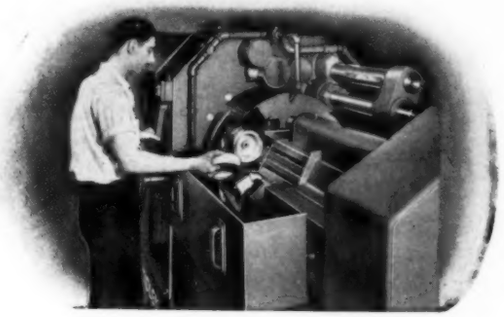
If you visit the Wico Electric plant

they will probably point out this machine



This progressive manufacturer, ever alert to increasing manufacturing efficiency, sought a better way to machine a rather large and "difficult" magneto housing. There are three different materials in the piece—aluminum die casting, steel bushing and liner, and brass spacer. The tapered hole in the bushing requires a fine finish and close tolerance. The inside diameter of the liners must also be closely maintained.

The housing was formerly turned out on four turret lathes at the rate of 28.8 per hour. New Britain engineers proposed replacing these four lathes with a single Model 695 New Britain chucking machine. Here are the results:

Regular production rate over a six-month period — 102 pieces per hour. Uniformity and over-all quality substantially improved. Cost per piece reduced from 55¢ to 12.8¢. Operator fatigue practically eliminated. Wico management reports that the new machine will pay for itself in less than two years, and completely meets every requirement on this "difficult" piece.

Since the earliest days of automatic machines, the ability of New Britains to reduce production costs and provide a foundation for increased employment has been an important factor in the growth of American manufacturing. This ability, as well as the range of work New Britain automatics can perform, is constantly being expanded by New Britain engineering and research. Why not check over *your* work with the New Britain sales engineer in your locality.

ENGINEERING DETAILS

Fourteen tools are fed in by the main tool slide, and the fact that three different metals are cut at the same time makes the production rate outstanding. To produce the fine finish and close tolerance of the taper bushing hole, two boring, one counter-boring and two taper reaming operations are performed. Two roughing cuts and one finish operation are employed to assure high uniformity and good finish in machining the segment inserts.

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NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

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On the basis of our experience as the world's largest producer and user of alloy seamless mechanical tubes, our Technical Staff is qualified to help you make better parts—at lower cost. Ask for our "on-your-job" analysis and our free 8-page folder "Timken Seamless Steel Tubes, Finishes and Sizes". No obligation, write today to Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

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